



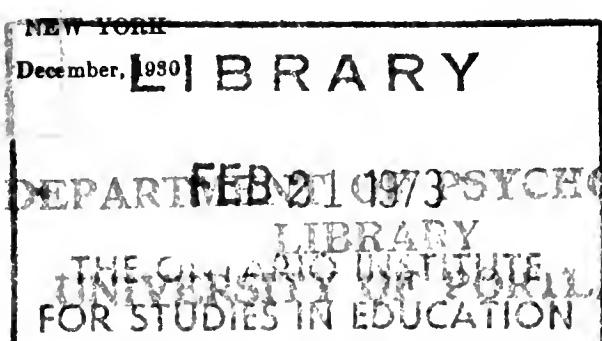
# SUGGESTIBILITY IN THE NORMAL AND HYPNOTIC STATES

BY  
**GRIFFITH W. WILLIAMS, Ph.D.**  
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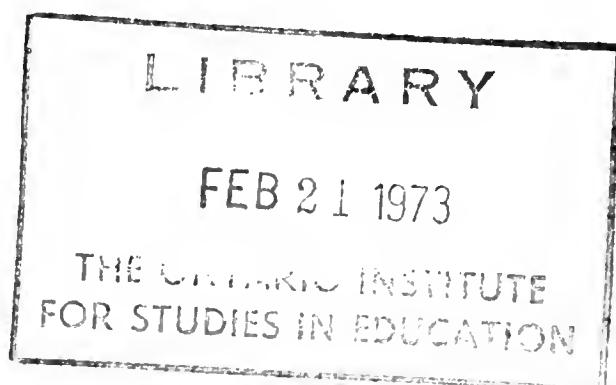
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# Suggestibility in the Normal and Hypnotic States

## CHAPTER I

### *Historical Introduction*

Early investigators in the field of hypnosis realized that there was some connection between hypnosis and suggestion but, nevertheless, the two fields of research have developed independently of each other. Hypnosis remained in the realm of clinical speculation while several experimental techniques were being developed for the investigation of suggestibility. With the use of these newer techniques it is now possible to return to the experimental investigation of the relationship that exists between the two.

An obscure Portuguese monk, L'Abbé Faria, is said to be the first to have realized the relationship between hypnosis and suggestion. His own expositions were ridiculed but his theory continued to attract the attention of workers in this field. A quarter of a century later this theory received what is perhaps its most significant development in the writings of James Braid, an exposition which is still accredited in its essentials. Although Braid's theory has been the occasion of much conflict of opinion it seems to have outlasted most of the opposing theories and some of the more recent experimentation tends to confirm its validity. Proponents of this theory include the French physician Liébeault and his pupil Bernheim. In his extensive writings the latter has applied his theory of the trance as a state of heightened suggestibility to many problems of clinical medicine. This extensive development of the theory that suggestion and hypnosis are closely related is known as the Nancy theory of the nature of hypnosis. The most prominent antagonists of this theory in recent times are known as the Paris school, of whom Janet is representative. For this group any form of suggestibility is hysterical and consequently pathological in nature. The controversy between the Nancy and Paris schools was the occasion for voluminous writing and much personal antagonism. From the point of view of modern psychology it is surprising that a

controversy which engendered such bitter antagonism on both sides should not have produced sufficient experimentation to settle the dispute. But the point of view was medical and clinical and the course of the controversy is marked, not by new experimental data, but by arbitrary definition and dogmatic assertion such as that of Janet's, in which he states that "a tendency to suggestibility and subconscious acts is the sign of mental disease, but it is, above all, the sign of hysteria." (9:289) A critical and experimental attitude has only recently been substituted for this argumentative one.

The progress of research on suggestibility has a somewhat different history. When suggestibility began to be recognized as a characteristic of "normal" people it rapidly became a center of vigorous research. The history of this research probably begins with Ochorowicz (13) who published his results in 1887. By means of a ring placed on the subject's finger he was able to induce numbness and rigidity as a result of the suggestion implied in the instructions and in the wearing of the ring. He concluded that those who were susceptible to this suggestion would probably make good hypnotic subjects. His work, however, is so saturated with the "mysterious" and occult that it becomes little more than a bibliographical curiosity to recent investigators. The work seems to be of equal significance to the history of both hypnosis and suggestion but is usually listed under the latter. The subsequent course of experimentation on suggestibility seems to have restricted itself to the non-hypnotic aspects of the problem. The work was developed rather rapidly by three American psychologists —Scripture (15), Gilbert (6) and Seashore (16). These three developed many techniques which have been repeatedly used by subsequent investigators, especially those who have investigated suggestibility with reference to sensory limens. In 1900 Binet published his monograph, *La Suggestibilité*, (4) a work to which most subsequent investigators are indebted to some extent for either their technique or apparatus. Among more recent experiments may be mentioned the work of Brown (5), Beck (3), Aveling and Hargreaves (1) and Otis (14). Their work is of significance in this connection mainly because of its bearing on the question of whether or not there is a "general factor" of suggestibility. Brown tested a large number of adult college students and concluded

that there is no generalized trait which can be called suggestibility. Beck also worked with adults who were members of a hospital staff and concluded that "one cannot draw from results on one type of suggestion test any conclusions regarding suggestibility in general." (3:269) Aveling and Hargreaves, however, after testing a much smaller number of grade school children concluded that "there is evidence which points to a general factor of suggestibility complicated by group factors." (1:75) Otis also worked mainly with grade and high school children and came to the conclusion that "there is a trait that we may call ability to resist suggestion." (14:95)

Such a development of methods for the investigation of suggestibility offers at least one approach to the solution of the problem of the relation of hypnosis and suggestibility. Every experimenter on the phenomena of hypnosis is faced with this problem and the inability either to control or equalize suggestions given in the normal and trance states has sometimes vitiated work which otherwise would have been significant. It becomes increasingly important as the experimental work on hypnosis progresses that some accurate determination of the relation between hypnosis and suggestion should be made. This is important both from the point of view of experimental techniques and from that of a theory of the nature of hypnosis.

These new techniques are used in several recently reported experiments which have a direct bearing on the relationship between suggestibility and hypnosis. All of these, including the research reported in this monograph, lack conclusiveness owing to the small number of subjects used. This is a characteristic difficulty of contemporary hypnotic research, but fortunately it is also characteristic of recent research that there is an attempt to state the relationship in quantitative terms. A vigorous attempt is also made to restrict experimentation to normal individuals, a procedure which contrasts very favorably with the older one in which there was almost invariably some pathological factor which complicated the interpretation of the data obtained in the "research." This attention to the quantitative statement of results and the attempt to eliminate all subjects showing pathological characteristics is one of the most promising features of research in this field. While these are routine requirements in all other

psychological research, they have been almost completely ignored in the clinical investigation of hypnosis.

Several methods of approach have been used by investigators to determine the relation of suggestibility and hypnosis. A group test of suggestibility was used by Barry (2) in which the subjects were asked to express their opinions on questions of conduct, politics, etc. After a preliminary test of their opinions the subjects were tested a second time and on this occasion they were told the opinion of the majority of the subjects on the questions asked. An index of their suggestibility was thus obtained by finding the degree to which they changed their opinions in order to agree with the majority. An index of their hypnotizability was secured by having them put into the trance by three experimenters each of whom would rank them on the facility with which they could be put into the trance. An average of these rankings was then regarded as an index of hypnotizability. Twenty-two subjects were used and the correlation between the two indices is  $.22 \pm .13$ , a result which leads Barry to conclude that "while the evidence in these experiments is far from conclusive, it would tend to show that hypnotizability and suggestibility are entirely different processes, at least so far as suggestibility may be defined by results from the present test." (2:139) A somewhat different result is reported by Travis (17) who found that, in general, those whose auditory thresholds were lowered during reverie were of the suggestible type and those whose thresholds were raised were of the negativistic type. Furthermore when an attempt was made to hypnotize these subjects it was found to be possible to do so in every case in which it was tried with those whose sensory threshold was lowered during reverie. It was not possible to hypnotize a single subject whose threshold was raised during reverie (12). This study would, therefore, tend to indicate that some correlation exists between suggestibility and hypnotizability, the presumption being that this correlation is very high although it has not been stated quantitatively.

The work reported by Krueger, although approaching the problem in an entirely different way, carries the work of Travis one step further by studying in the one case, (11), the relationship between suggestibility and the depth of trance and in the other case, (10), the rate at which a state of hyper-

suggestibility can be induced and some indication of the way in which it declines. The observed fact that a subject goes into the trance faster a second time than he did the first time was used as the basis of his first research and the rate at which a second trance can be induced when it is separated by varying intervals of time from the beginning of the first trance is used as a criterion for estimating the increase in suggestibility. The results obtained are not conclusive on account of the small number of subjects used but the tentative results show that the greatest increase in suggestibility occurs at the beginning of the period of trance induction, the curve plotted from the data showing a high degree of negative acceleration. The degree of hypersuggestibility varies somewhat during the course of the trance while about 50% of the trance effect persists after the termination of the trance and apparently decreases gradually until the normal pre-trance level is reached. In his second study Krueger used thirteen subjects and tried to determine the effect of repeated hypnotization and periods of disuse upon the rate at which the trance can be induced. With the time taken for the eyelids to close as a criterion of the onset of the trance he found that repeated hypnotization produced a practice curve showing negative acceleration. The same effect was obtained whether the interval between the several trances was five minutes or 24 hours. A further resemblance to the ordinary learning curves is found in the fact that after a period of non-practice or disuse, whether of 24 hours in the case of the trances separated by five minute intervals or 13 weeks in the case of the trances separated by 24 hours, there is an increase in the time necessary to induce the following trance. These two studies, while not entirely conclusive, suggest that the phase of suggestibility affected by hypnosis follows the laws of ordinary learning.

The work reported by Hull and Huse (7) shows that while Krueger found an increase in suggestibility as measured by the induction of the trance itself to be produced by hypnosis, this increase in suggestibility is also characteristic of another type of reaction tested in the trance. This work is so closely related to that reported in this monograph that an extensive summary of the data is given in Chapter V. These writers found a decrease of 60% in the time of response of a group of eight subjects to suggestions of postural sway in the trance

as compared with their normal responses. The present writer's work is an amplification of this experiment and the extension of its technique to other well-known tests of suggestibility.

## CHAPTER II

### *Statement of the Problem*

It is always desirable and frequently essential that all terms should be defined before undertaking a research project. The alternative seems to be to approach the problem empirically and while controlling certain variables to observe the consequent reactions. A satisfactory definition can then be deferred until adequate data have been obtained. The latter course was followed in the investigation reported in this monograph. A summary of the definitions of suggestibility that occur in the standard texts of psychology has recently been made by Otis. (14:5-9) A very wide divergence of opinion is apparent and it does not seem profitable to attempt to reconcile them at this time. The definitions vary from the opinion that suggestibility is a pathological characteristic of hysteria to the one that "a suggestion is any stimulus . . . which touches off a determining tendency" and again to one which recognizes "the dependence of suggestibility upon sexuality and the activity of the libido." The divergence of opinion shown in these representative definitions is much too great to provide an adequate basis for research.

In the research reported in this monograph it was assumed that there was some relationship between suggestibility and hypnosis. This assumption was based on the results of the experiments summarized in the previous chapter and their agreement with Bernheim's theory that the trance is a state of increased suggestibility. With this as a working hypothesis, it was decided to take some of the recognized tests of suggestibility and try to discover whether any difference could be observed in the trance reactions as compared with the normal ones. In this way it would be possible to determine whether the trance is a condition of heightened suggestibility, at least to the extent that these frequently used tests of suggestibility measure that factor. The nature of the research is, therefore, to apply certain well-recognized tests of suggestibility to a group of subjects in the normal and trance states when all other conditions, except that of being in the normal and trance states, respectively, are kept constant. It will then be possible to see whether the fact of being in the trance varies concomitantly with an increase in suggestibility.

In the exposition that follows the term "normal" is used in contrast to the term "trance." The term "normal" is used in this connection merely to designate the norm of behavior to be observed in a typical group of subjects under average conditions. It does not imply any theory whatsoever concerning the abnormal or pathological nature of trance behavior. The term "waking" is frequently used as an alternative for "normal" but this term immediately implies a theory connecting natural sleep with the hypnotic trance. Recent research tends to cast a serious doubt upon the relationship of these two and it seemed better to adopt the term "normal" implying thereby merely the norm of behavior from which all behavior will deviate as soon as a constant variable is introduced into the experimental situation.

## CHAPTER III

### *Apparatus, Procedure and Techniques*

#### APPARATUS AND PROCEDURE

Several pieces of apparatus were used in this series of experiments. All of these were either copies of apparatus described and used by other experimenters or slight modifications of them, while two of them, the weights and the lines, have almost become classic because of their repeated use since they were originally described by Binet. All of this apparatus except the standard accessories was made in the laboratory. A description of all the apparatus, except the standard accessories, is given below together with the way it was used in these experiments. During the actual experimentation it was conveniently arranged on a large table in the experimenter's room.

1. *Postural sway.* The apparatus used to obtain reactions to suggestions of postural sway has been recently and quite fully described by Hull (8) who devised it and published the first experimental study of its use (7). The essential feature of the apparatus is a tracer for recording the horizontal swaying of the body. This tracer consists of a sharp metal point attached to the end of a small steel rod which moves in a vertical sleeve. This rod is attached to a thread which runs over a pair of aluminum pulleys to the subject's garment thus producing a movement of the tracer whenever the subject moves. The thread is attached to the subject's garment at a point between his shoulders by means of a small hooked pin which can readily be attached or detached without the subject's knowledge. The entire experiment can be carried out without the subject's awareness of being attached to any recording device. By means of this apparatus a horizontal movement of the body is recorded on smoked paper as a vertical tracing, the movement of the body being reduced to one-third of its original size by means of the pulleys. A photograph showing the apparatus in use is reproduced in Fig. 1 and Fig. 2 is a greatly reduced reproduction of one of the records.

No specific instructions were given to any of the subjects except one group of six subjects tested by the writer (Group

2) and the control group of eight subjects (Group 5). The data from these two groups are given separately in Chapter VI. All the others were told when they entered the laboratory that there were no special instructions necessary for the experiment. They were then given two preliminary tests for their reaction to suggestions of postural sway, the only comment on the experimenter's part being, "I shall need to blindfold you for this experiment." If they responded positively they were told to return for training in going into the trance and for the subsequent testing. On the experimental days the only instructions were, "You are to listen carefully to what I am saying and think about what I am saying." These instructions were given while they were being blindfolded. On this account the subjects, other than the two groups mentioned above, were not given any idea of the purpose of the experiment and questioning after their entire work was completed revealed that none of them had discovered the real nature of the experiment.

The subjects of Group 2 were told to read the following typewritten instructions immediately before they were blindfolded for the normal and trance tests on each experimental day:

#### EQUILIBRIUM EXPERIMENT

"The purpose of this experiment is to determine the acuteness of your sense of equilibrium.

"In order that your vision may not interfere with the experiment, I shall blindfold you and then proceed with the experiment. You are to listen carefully to what I am saying and to think about what I am saying."

When the subject was tested in the trance state he was first put into the trance, told to open his eyes and read the instructions and then blindfolded. The tests were given without further comment. This procedure was not repeated before the second tests, the subject remaining in his original position until the stimulation for the second test started.

The control group, Group 5, were instructed to simulate a positive response to suggestions of postural sway and some of the characteristics of the hypnotic trance. After the preliminary testing in which they showed a refractory or negativistic attitude so as not to respond to the suggestions, they were

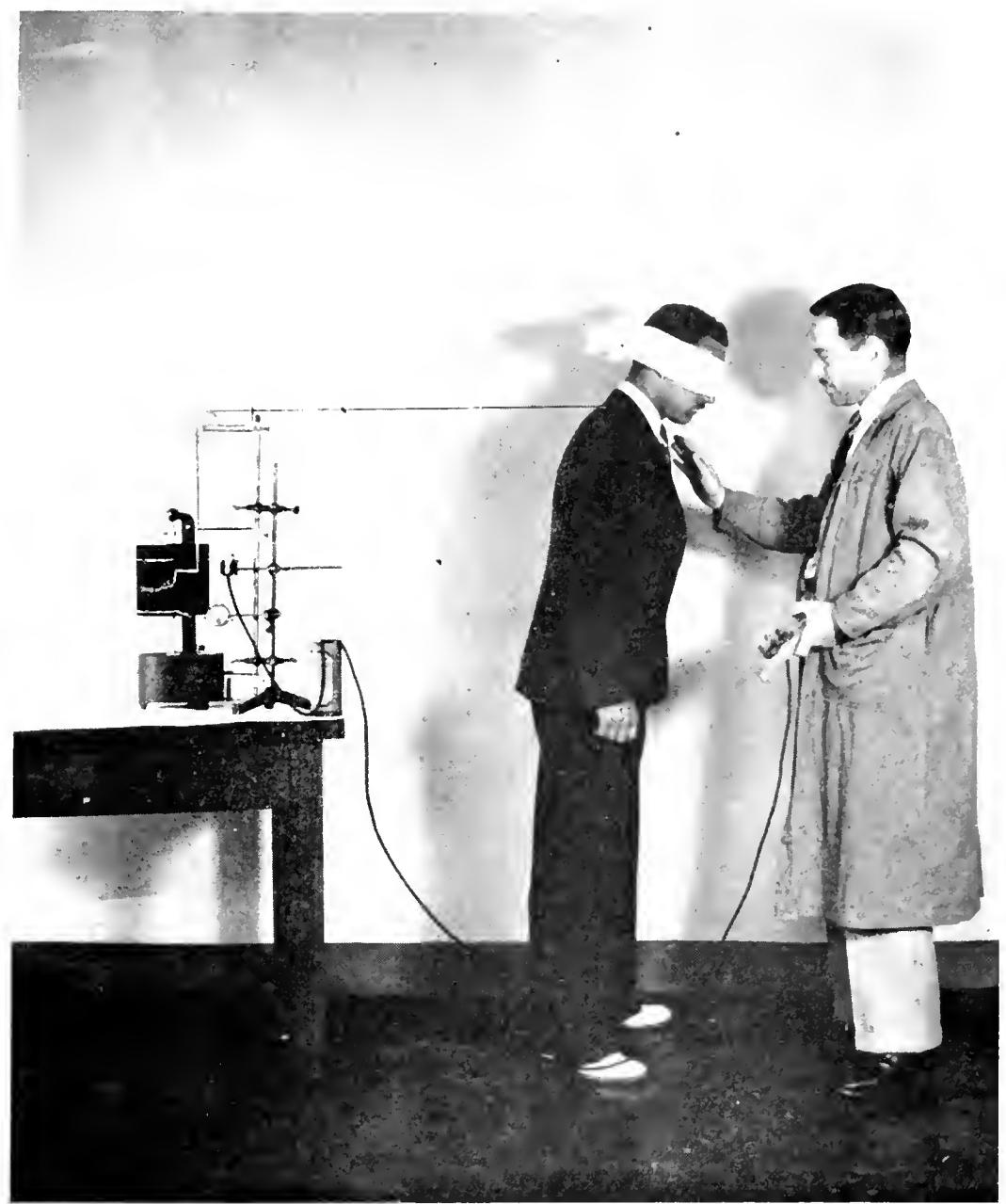


FIG. 1. Showing the apparatus for recording postural sway. The subject is posed so as to show the beginning of a response to the experimenter's suggestions. See p. 13 for a description of the apparatus.

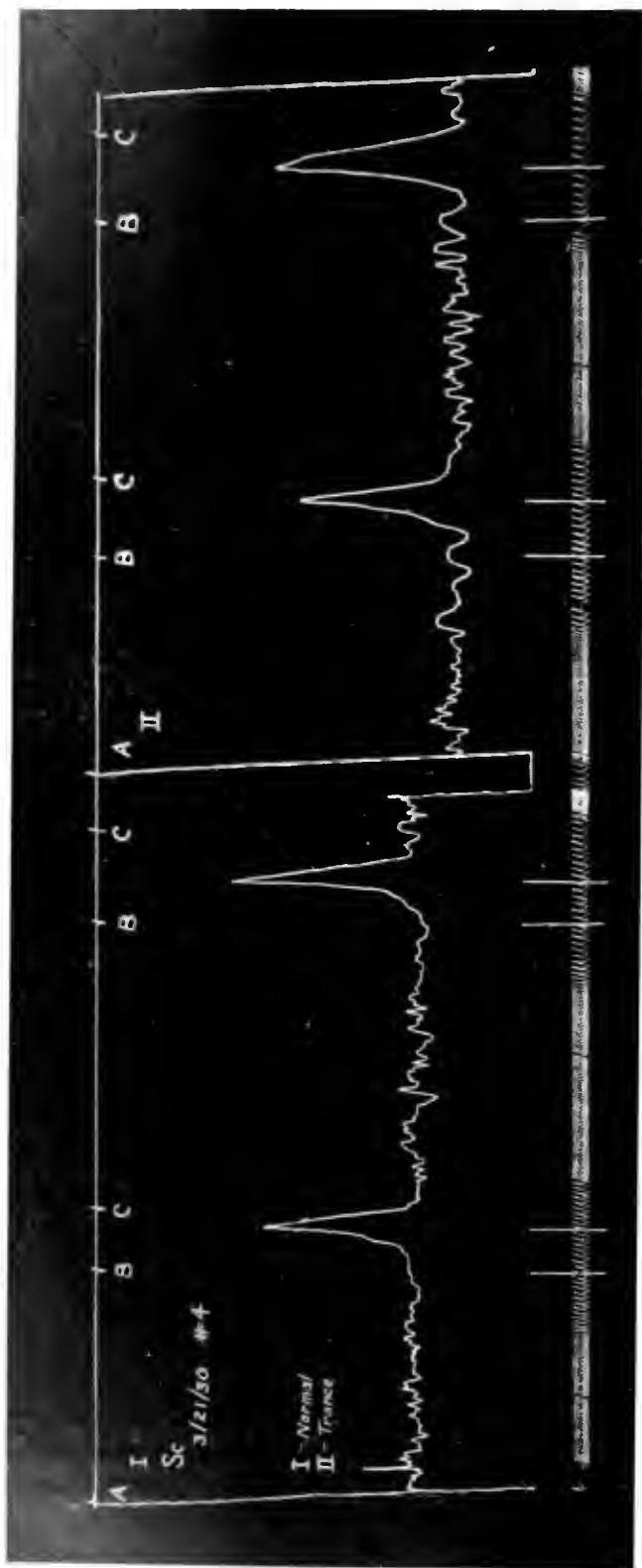


Fig. 2. Showing a typical record of response to suggestions of postural sway. The first half of the record shows the two responses made in the normal state and the second half shows the two responses made in the trance state. On the record are shown, in order from the top, (1) the signal line with the letter A indicating the beginning of the experiment, B the beginning of the suggestions and C the end of the suggestions after reaching the point of maximum response; (2) the initials of the subject, date and number of the record; (3) notation to indicate the state of the subject during each half of the record; (4) the record of the response to suggestions as well as the intervening periods when no suggestions were given; (5) the time line, in seconds, with lines drawn from point B on the signal line and from the point of maximum response in order to determine the time of response. This time of response has been used as the measure of suggestibility in these experiments. The variation in the time line is due to decreasing the speed of the kymograph between the periods of suggestion. The data from this record are shown in Table 3.

instructed verbally by Professor Clark L. Hull. These instructions were written out by Professor Hull and are given below:

"For some time we have been carrying out in this laboratory some very careful experiments on the psychology of hypnotism. In this work we are always in danger of having our experiments spoiled by employing subjects who pretend they go into the trance but who really are not hypnotized. You can easily see that it is very important for us to have a test which will enable us to tell whether a subject is really in the trance or not. We believe that we now have a test by which we can tell from the behavior of a subject whether he is in a trance but we cannot be sure until the test has been tried out on some people whom we know are simulating. In order to make our test conclusive, we must know not only that the subjects are pretending to be in the trance but that they actually are not in the trance. In order to be sure that the subjects have not been influenced by suggestions we have chosen you and a small number of others because you have shown in a preliminary experiment that you are entirely immune to the influence of suggestion. Now, in this experiment Dr. Williams will suggest to you that you will do certain things; for example, he will suggest that when you are standing blindfolded you will fall forward toward him and that you cannot help yourself. When he does this you are to resist a short time and then respond to his suggestions voluntarily but pretend, in whatever way it seems most natural to you, that you are really doing it in response to his suggestions. At other times he will try to put you into a trance; he will tell you that your eyes are closing and that you cannot keep them open. When he does this you are to wait a reasonable length of time and then close your eyes voluntarily, but act as nearly as you can the way you think a person would if he were actually going into the trance. But you must be very sure that you do not go into the trance. One indication that the subject really is going into the trance is that he feels rather drowsy. But the most certain way of telling is as follows; After the subject's eyes have closed Dr. Williams gives him some further suggestions, finally telling him that he cannot possibly open his eyes no matter how much he tries. When he tells you this you are to open your eyes instantly, if possible, just to be sure that you can do so. You are then to close them immediately and go on with the experiment as if nothing had happened, but note very carefully when you do this whether they tend to stick together or not, or whether you have any special difficulty in deciding to open them. If any of these things happen, it indicates that you have been influenced by the suggestion. Note these things very carefully so as to tell me all about it when I talk with you after the experiment is over.

"Please do not read up about hypnosis or talk to anyone about it because we want to see what a person unacquainted with hypnosis will do in the experiment. Do not try to think up any special plan but do just what you think would be natural at the time you do it."

The experimenter was not present when these instructions were given. The tests of this control group were conducted in identically the same way as those of Groups 1 and 3, i.e., no further comment was made except to instruct them, "Listen carefully to what I am saying and think about what I am saying," which was done while they were being blindfolded. When each of these control subjects had finished the required number of experimental periods he was questioned by Professor Hull in order to discover whether he had been affected in any way by the suggestions and was then sent back to the experimenter for one more test in which he was told not to simulate but to act naturally. This final test was taken in order to discover whether any change had taken place in the subject's reactions on account of the repeated suggestions to which he had been subjected.

The stimulation for this experiment was done verbally by the experimenter and was similar for all groups used in these experiments. After an interval of one minute had elapsed subsequent to attaching the subject to the apparatus, the following suggestions were given:

"Now you will begin to feel yourself falling forward, falling forward. You are beginning to fall forward, falling, falling forward. You are falling forward now, you are falling forward, a little more, more, falling forward farther, farther, farther forward still. You cannot help yourself. You are falling forward, etc."

These suggestions were given in a quiet and persuasive tone so that any indication of a commanding attitude on the experimenter's part was scrupulously avoided. A few very brief pauses were interspersed so as to avoid undue monotony. This stimulation was continued until the subject fell forward to the point at which he would lose his balance. The experimenter then placed his hand lightly on the subject's shoulder and pushed him backwards very slowly. These movements were carried out so smoothly that some of the subjects did not know that any movement had occurred in either the trance or normal state. If the subjects did not respond (see Table 3) the stimulation was continued for three minutes. The signal-key was always pressed at the first word of the stimulation, "Now," so as to indicate the exact point at which the stimulation began. This is shown by the points marked "B" in

Fig. 2. The time taken to respond was obtained by drawing a line from the point on the signal line which marked the beginning of the suggestions to the time line and a similar line from the point of maximum response. The time could then be read directly in seconds. Interpolations for one-half seconds were made when necessary. These lines are shown in Fig. 2.

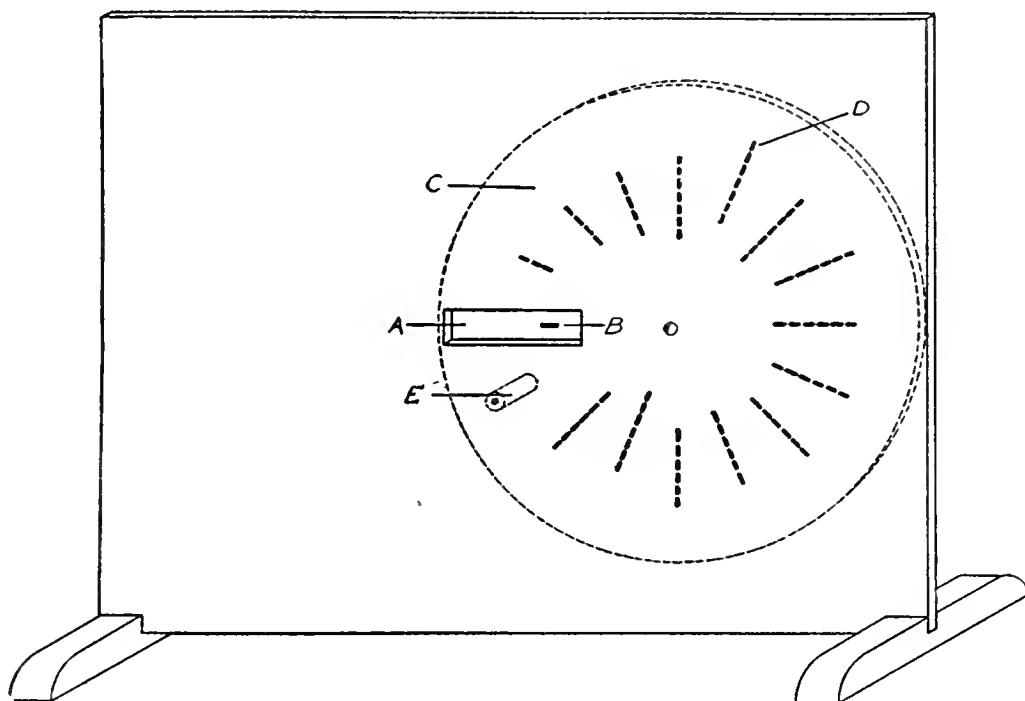


FIG. 3. Showing the apparatus used in the experiment with the lines. The disc on which the lines are drawn as well as all the lines except the one appearing in the slot at B are shown in dotted outline. See text for full description.

**2. Lines.** A drawing of the apparatus used for exposing the lines is reproduced in Fig. 3. The lines are drawn upon a disc (C) which is made of drawing board and attached by means of a small screw at its center to a beaverboard screen in which there is a slot (A). The disc is turned by means of a handle (E) which is placed at its back. Each line (D) can then be exposed in the slot separately (B). These lines are not placed equally at the center of the slot so as to forestall the possibility of having the subjects judge their lengths by this means. The length and arrangement of the lines are similar to, though not identical with, those used by Binet (4:110) and Brown (5:344) and described by Whipple (18: 602). There are 15 lines, the first five of which are 12, 24, 36, 48, and 60 mm. long, respectively, the remainder being also

60 mm. long and similar to the fifth in every way except for their relative positions in the slot. In the experiment the subject's responses were made on a piece of quadrille paper ruled in quarter-inch squares and 15 x 26.5 cm. in size. This size and type of paper was kept uniform throughout. A margin was drawn about two cm. from the left side of the paper.

The instructions were taken almost verbatim from Brown (5:344) and typed on a sheet of paper which was handed to the subject before each type of test, i.e., before the first normal test and before the first trance test. This procedure was not repeated before the second normal and trance tests which were given one and one-half mins. after completing the first tests. Group 2 was an exception as only one test in either the normal or trance state was given on each experimental day. The instructions were as follows:

#### ESTIMATION OF LENGTH OF LINE

"It is the purpose of this experiment to test your ability to estimate the length of short lines. You will see one line at a time and you are to reproduce it right afterward from memory. Take one look at the line and then make a mark on the cross-section paper just the distance from the left-hand margin that the line is long. Then say "ready" and the next line will be shown to you. Make your estimate of it just under your estimate of the last line and so on for all the 15 lines.

Further instructions were found to be necessary only in the case of two or three subjects who started by drawing the first lines instead of marking off their distances. This correction was made verbally.

The responses were scored by counting the number of lines judged longer than the preceding one when the actual stimulus was the same, i.e., the number of such judgments made for the lines numbered 6 to 15. This criterion was adopted in preference to other possible ones such as the ratio of each line to No. 5 because it was felt to be the most adequate measure of the factor being investigated.

*3. Weights.* A drawing of the weights used is shown in Fig. 4. These consisted of 15 plainly numbered cardboard boxes obtained from a drug store and measuring 4 x 4 x 1.8 cm. The first five weights used were 20, 40, 60, 80, and 100 gr., the remaining ten boxes being also 100 gr. The required weights were obtained by taking the necessary amount of lead shot

which was held in position by paraffin wax. These were weighed on a delicate balance to insure accuracy. The weights are similar to those used by Binet (4:161) and Brown (5:340) and described by Whipple (18:598).

The instructions are identical with those used by Brown (5:340) and were given in the same way as described for the lines.

"This experiment is intended to test your ability to distinguish between weights. Lift the weights, one after the other, as directed by the experimenter, beginning on the left. As you lift each weight say whether it is heavier, lighter, or the same as the one just before it. All that you have to say is either "lighter," "heavier," or "the same." Remember you are to compare each weight with the one lifted just before. Do not lift any weight more than once."

Nothing was added to this except that it was found necessary to determine whether the subjects were right- or left-handed and instruct them to use the preferred hand. They were allowed to proceed at their own rate.

The subject's responses were recorded by the experimenter. The criterion used for measuring suggestibility was the number of weights judged heavier than the preceding one when the weights were actually the same, i.e., the number of such responses made for the weights numbered 6 to 15.

4. *Warmth.* A drawing of this apparatus is reproduced in Fig. 5. The part seen by the subject consists of a wooden base on which is mounted a coil of resistance wire (A) three cm. long and one cm. in diameter. This is directly connected with a single pole, single throw, knife-blade switch (B). The current used comes from a socket in the wall which is connected with the switch by means of a cord which lies on the table. Closing the switch would then seem to close the circuit and heat the coil. But another connection is made with the switch by a cord (D) running through a hole (C) in the wooden base and table. This is placed on the experimenter's side where it cannot possibly be seen by the subject. The cord (D) then leads to another push-button switch (E) which is attached to the leg of the table and is in series with the knife-blade switch. This is operated by the experimenter's knee without the knowledge of the subject. In this way it is necessary to close both switches in order to heat the coil. When the knife-blade switch alone is closed no heat can possibly be generated in the

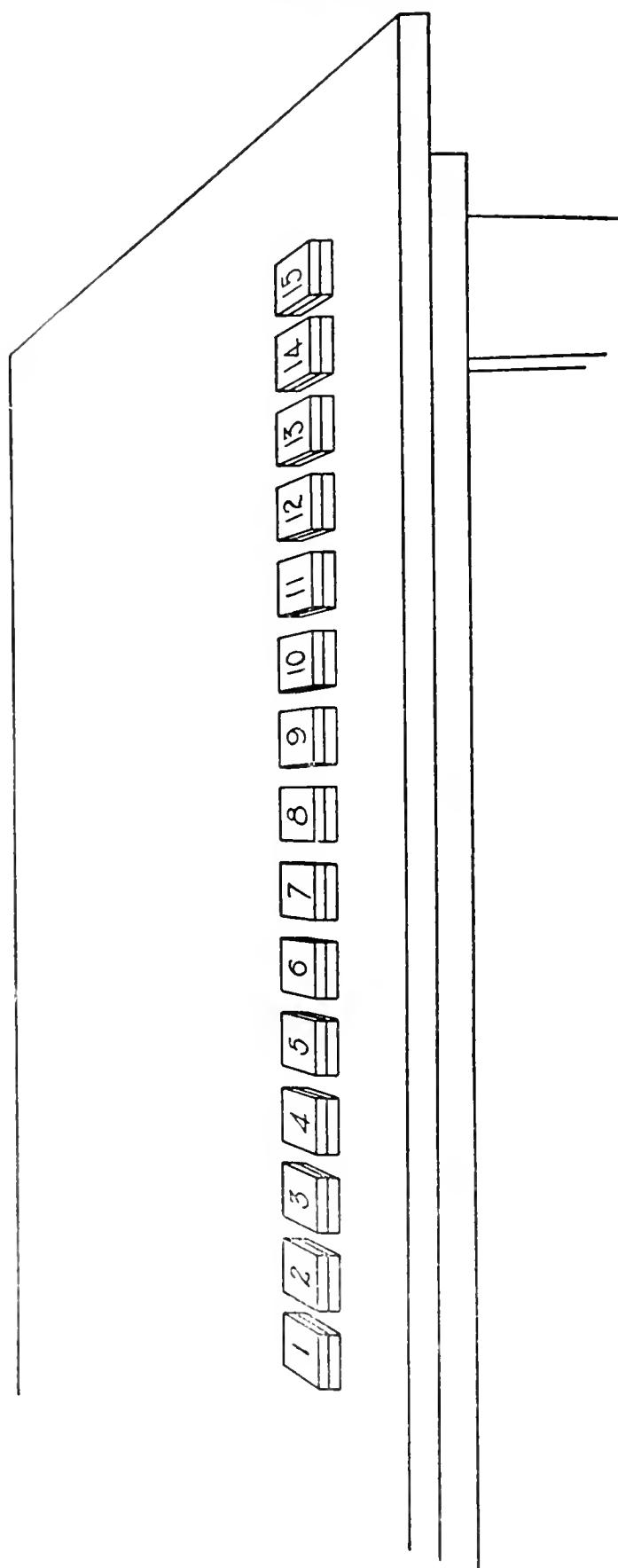


FIG. 4. Showing the boxes used in the experiment with the weights. See text for full description.

coil. The amount of current used was two volts D.C. derived from a storage battery located in another room. For the first four records each of two of the subjects in Group 2, however, a current of four volts was used, but this was found to heat the coil somewhat too quickly. The change to two volts does not affect the tabulated results owing to the fact that the time of response is not used as a criterion of suggestibility and the further fact that these records were equally divided between the normal and trance states.

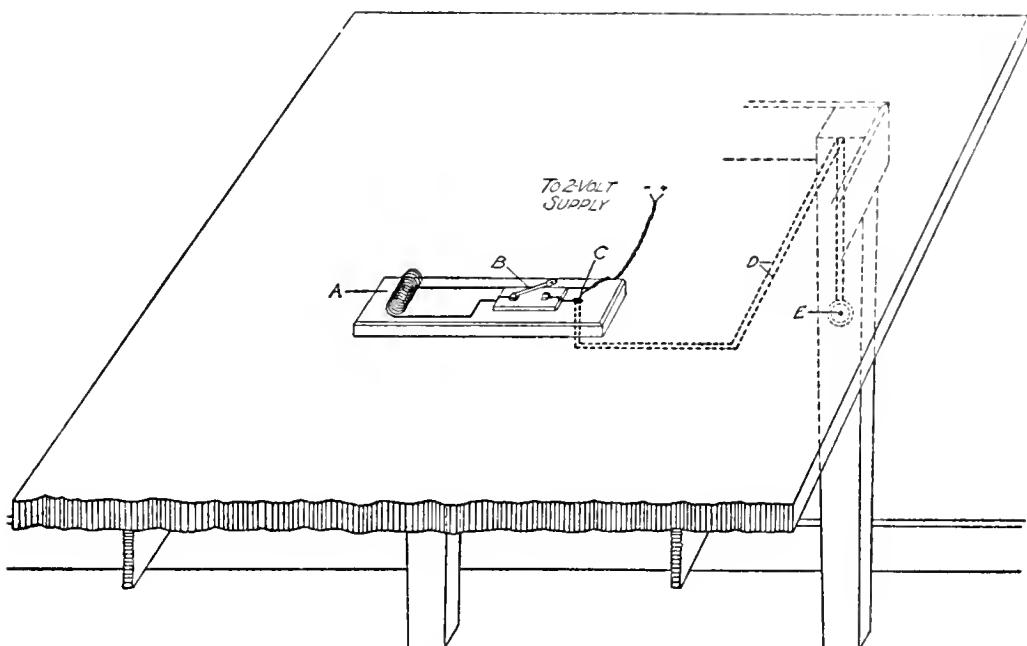


FIG. 5. Showing the apparatus used in the experiment with the warmth. The part not seen by the subject is shown in dotted outline. See text for full description.

The following typewritten instructions were given to the subjects in the same way as in the other experiments:

#### LEAST PERCEPTIBLE WARMTH

"The purpose of this experiment is to determine the smallest amount of heat that you can feel with your finger.

"When the experimenter says 'ready' you are to place your finger on the coil and hold it there until you can *just barely* feel the warmth. *At the instant* you feel any warmth whatsoever remove your finger sharply from the coil. Then wait until the experimenter tells you to replace your finger on the coil."

At the word "ready" the experimenter closed the knife-blade switch. For the first four stimulations the push-button switch was also closed thus closing the circuit so that the current

heated the coil. The following six trials were made by closing the knife-blade switch alone so that no warmth could be generated in the coil. The subject continued to touch the coil for 30 seconds if he had not already responded to the suggestion of warmth. If no response was made within 30 seconds the experimenter said, "All right, you did not feel it this time" and the subject removed his finger. After each trial when heat was generated in the coil, the experimenter felt the coil and continued to do so until the coil was back to the normal room temperature. Exactly the same routine was followed in the cases when no heat was generated and a pause was made equivalent to that necessary for the coil to cool after being heated. This routine was followed irrespective of whether the subject responded to the suggestion or not. This was calculated to heighten the suggestion involved and that the procedure was effective in doing so is shown by such remarks as, "Strange, I could not feel it at all that time" which were frequently made by the subjects.

The responses were recorded by the experimenter. In this experiment, the time taken to respond was also recorded. The time of response, however, was not found to add any significant data to the main purpose of the investigation.

5. *Touch.* The apparatus used in this experiment is shown in Fig. 6. A screen, 60 cm. long and 45 cm. high was made of a piece of thick black sateen cloth suspended on a rod which is attached by clamps to two upright standards. The bottom of the cloth rests on the table. Six weights were made by suspending small pieces of cork from the end of a light rod by means of a fine silk thread. The corks were of gradually increasing sizes from a thin wafer to one measuring 15 mm. in height as is indicated in the figure.

The following typewritten instructions were handed to the subject in the same way as in the previous experiments. The instructions are similar to, though not identical with, those of Brown (5:304).

#### LEAST PERCEPTEBLE WEIGHT

"You see this set of small cork weights. Some of them are so light that they cannot be felt at all. It is the purpose of this experiment to find the lightest of this set of weights which you can just barely feel on the tip of your middle finger. When the experimenter says 'ready' you are to see whether you can feel the weight or not and report to the experimenter immediately by saying 'yes' or 'no'."

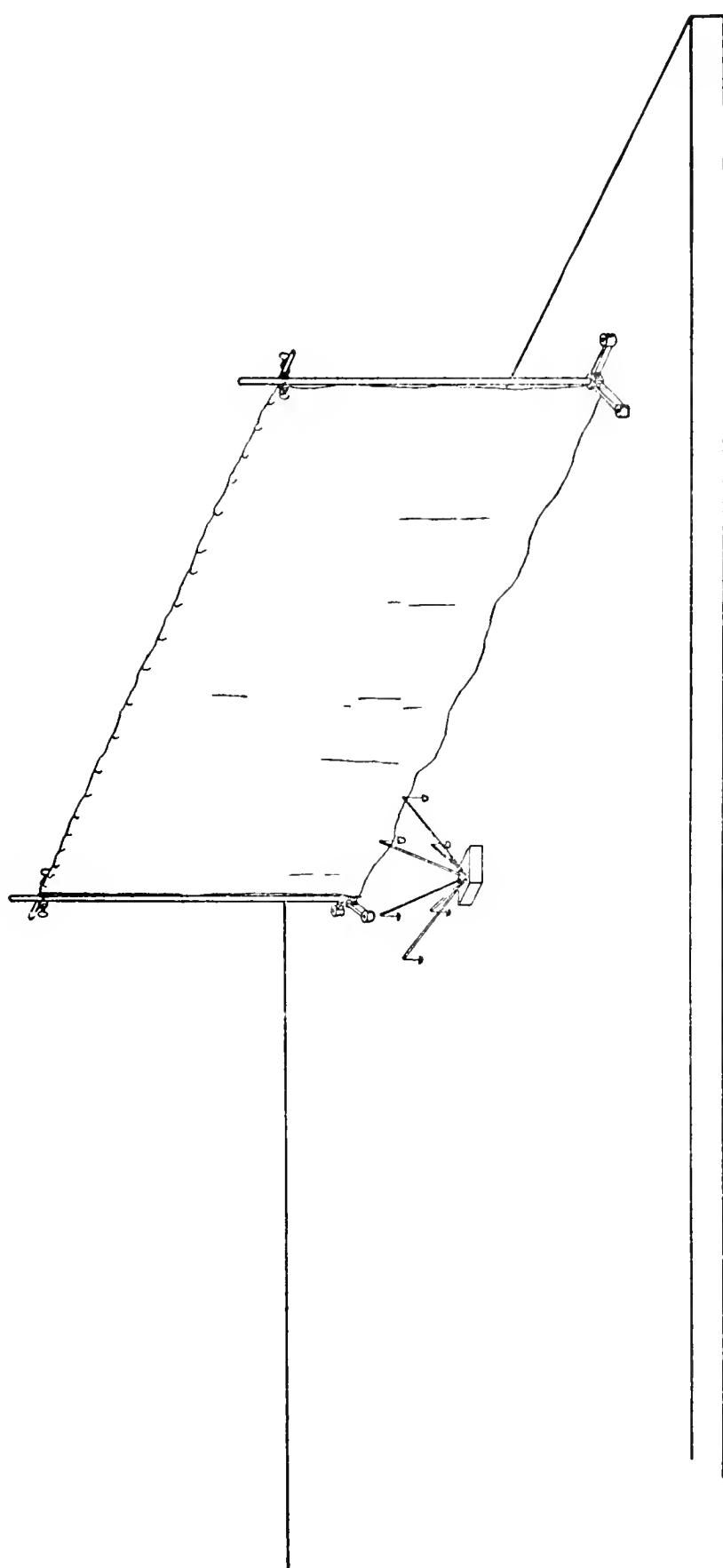


FIG. 6. Showing the apparatus used in the touch experiment. See text for full description.

After reading the instructions the subject was told to close his eyes and one of the heavier weights was placed on the tip of his second finger. The subject was asked whether he felt this and he invariably said that he did. This was then repeated with the lightest weight which was too light for the subject to feel. He was then told to open his eyes and see the weight resting on his finger. When this was done the subject placed his hand behind the screen for the tests. For the first four stimulations a gradually diminishing weight was used so as to make the fourth barely perceptible. For the remaining six tests there was no actual stimulation, but the rods were moved about by the experimenter behind the screen so as to produce a sound similar to that occurring while changing the weights when the actual stimulations were made. When an actual stimulation was made, a pause of three or four seconds intervened between the word "ready" and the actual placing of the weight on the finger. This was done in order to give the subject a period of anticipation and thus prevent him from responding immediately after the word "ready" when there was no stimulation. Both the noise of moving the rods and the pause was intended to increase the factor of suggestion in the tests. The responses were recorded by the experimenter.

#### TECHNIQUE

Two basic techniques were used for this series of experiments one of which, however, was only used for testing Group 2.

The most important of these techniques has been described and used by Hull and Huse (7). In this technique each subject served for four days on each part of the series of experiments, i.e., four days on the sway experiment, four days on the line experiment, etc. On each of these days there were four tests given which would make a total of 16 tests for each subject on every part of the series of experiments. One-half of these tests were made in the normal state and the other half in the trance state. These tests were arranged so that the normal and trance tests were given first on an equal number of days. In this way any constant error due to the uniform priority of either type of test is avoided. This was accomplished by the use of two testing sequences in one of which the two normal tests preceded the two trance tests (referred to as

sequence "A" in the tables) and in the other the two trance tests preceded the normal ones (referred to as sequence "B" in the tables). By further arranging these sequences in the A, B, B, A order it was also possible to avoid having a constant error in the data on account of practice effect. The arrangement shown in Table 1 was consequently adopted. In this table the column "Symbols used in tables" indicates both the sequence of testing used on a given day and the arrangement of these sequences so as to distribute practice effect equally between the normal and trance data.

TABLE 1  
SHOWING THE ARRANGEMENT OF ALL THE TESTS MADE ON TWO OF THE SUBJECTS  
IN GROUP 1. SEE TABLE 3 FOR THE DATA OBTAINED FROM THESE TESTS.

Section	Subject	Date	Symbols used in tables	State during Tests			
				1st Test	2d Test	3d Test	4th Test
I	Sc	3-13	A	Normal	Normal	Trance	Trance
		3-17	B	Trance	Trance	Normal	Normal
		3-18	B	Trance	Trance	Normal	Normal
		3-21	A	Normal	Normal	Trance	Trance
II	H	3-10	B	Trance	Trance	Normal	Normal
		3-11	A	Normal	Normal	Trance	Trance
		3-13	A	Normal	Normal	Trance	Trance
		3-14	B	Trance	Trance	Normal	Normal

Each group of subjects was divided into two equal sections one of which started their experimentation with the two tests in the normal state to be followed by the two tests in the trance state, Sequence "A." The other section started with the tests in the trance state which were followed by the tests in the normal state, Sequence "B." The two sections thus balanced each other with respect to the priority of either the normal or trance tests in the experimentation. Furthermore, in order to prevent any error due to having the same section start all parts of the experiment with the same sequence, i.e., Section I starting all parts with sequence "A" and Section II starting all parts with sequence "B," the sequence of the two sections was changed for each part, e.g., Section 1 of Group 1 started with sequence "A" for the sway experiment and was changed to sequence "B" for the lines experiment. This is shown by reference to Tables 3, 4 and subsequent tables for this group. This technique was used for all the experimentation with Groups 1, 3, 4, and 5. The tests were given to Group 1 in the following order: postural sway, lines, weights and warmth.

The time elapsing between the two tests given in both the normal and trance states was one and one-half minutes. This interval was also used between the two tests of postural sway in the second technique which is described below. During this period the subject maintained his position and was not detached from the apparatus for the sway tests or moved from the chair in the case of the other tests. An interval of 15 minutes elapsed, however, between the end of the tests in one state and the beginning of those in the other. During this interval the subject was sent from the experimental room, allowed to move around, read, etc., so as to secure as complete a break as possible between the two states. This period was kept constant irrespective of whether the first tests were in the normal or trance state.

The second technique differed from the one just described by (1) having all the parts grouped together and having the subject tested on the entire series of experiments, in order, on each experimental day; (2) having the subjects tested only in either the normal or trance state on any given experimental day; (3) requiring only a total of eight days for completing the entire series of experiments instead of four days for each part, and (4) requiring but one test of each part, except the test of postural sway, on any experimental day.

This technique was used only with Group 2. As this modified technique required in the case of postural sway only two tests in *either* the normal *or* trance state to be given on any experimental day and in the case of the other experiments only one test on each day, the symbol "A" has been used in Tables 9 and 10, which contain the data obtained from this group, to indicate that on the first of the two given dates the normal tests were given and on the second date the trance tests were given. The symbol "B" indicates the opposite arrangement in which the trance tests were given on the first date and the normal tests on the second one.

Two arrangements of the separate parts of the series of experiments were made by reversing the order in which they were given. These arrangements were as follows:

Arrangement No. 1  
 Lines  
 Touch  
 Warmth  
 Weights  
 Postural Sway

Arrangement No. 2  
 Postural Sway  
 Weights  
 Warmth  
 Touch  
 Lines

These arrangements were made in order to equalize any distortion of results which might occur on account of factors such as summation which might make a subject more suggestible in the later tests of any single arrangement. The two arrangements, together with the necessity of alternating the normal and trance tests made necessary rather an elaborate table from which Table 2 is taken as an example:

TABLE 2  
SHOWING THE ARRANGEMENT OF ALL THE TESTS MADE ON FOUR OF THE SUBJECTS  
IN GROUP 2. SEE TABLES 9 AND 10 FOR THE DATA OBTAINED FROM THESE TESTS

<i>Subject</i>	<i>Experimental Day</i>							
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>
M	A <sub>1</sub>	B <sub>2</sub>	B <sub>1</sub>	A <sub>2</sub>	B <sub>2</sub>	A <sub>1</sub>	A <sub>2</sub>	B <sub>1</sub>
T	B <sub>1</sub>	A <sub>2</sub>	A <sub>1</sub>	B <sub>2</sub>	A <sub>2</sub>	B <sub>1</sub>	B <sub>2</sub>	A <sub>1</sub>
Cl	A <sub>2</sub>	B <sub>1</sub>	B <sub>2</sub>	A <sub>1</sub>	B <sub>1</sub>	A <sub>2</sub>	A <sub>1</sub>	B <sub>2</sub>
Co	B <sub>2</sub>	A <sub>1</sub>	A <sub>2</sub>	B <sub>1</sub>	A <sub>1</sub>	B <sub>2</sub>	B <sub>1</sub>	A <sub>2</sub>

In this table the letters "A" and "B" indicate whether normal or trance tests were given on each experimental day. The numbers "1" and "2" show which arrangement of the separate tests was given on each day. The two other subjects, B and L, whose sequences of testing are not included in Table 2 followed the sequences beginning "A<sub>1</sub>" and "B<sub>2</sub>," respectively, thus making a completely balanced program of testing for this group.

In these experiments the trance was induced by having the subject look at the tip of the experimenter's finger which was held about 12 inches from his eyes and on the same level as the eyes. After about 30 seconds the usual suggestions of feeling drowsy, etc., were given. When the subject's eyes had closed for about one minute he was told to open them and read the instructions for the first tests. The eyes remained open throughout all the tests except possibly when they were blindfolded for the postural sway tests. It was necessary to have the subjects stand for the sway tests, but they sat at a table for all the others. The trance was ended by having the experimenter count to three and give the instruction to "wake up." When the second technique described above was followed, the subjects were not brought out of the trance between the various parts of the series of experiments.

## CHAPTER IV

### *Subjects*

The subjects for this series of experiments were obtained from the Bureau of Appointments of Yale University. They were male students who were paid by the hour for their services to the laboratory. The hypnotic subjects in this group were trained to go into the trance by the writer, as none of them had been hypnotized before and only one of them had witnessed a demonstration of the simpler hypnotic phenomena. With this minor exception, therefore, all the subjects used were entirely ignorant of all the phenomena of hypnosis. At the end of the experimentation it was also found that none of them had discovered the purpose of the experiments. In all, a total of twenty-two subjects was used by the writer, fourteen of whom were hypnotic subjects and the remaining eight subjects were used as a control group. In view of the fact, however, that the same apparatus and technique were used by Hull and Huse (7) in attempting a solution of a part of the problem outlined in Chapter II, it was considered advisable to include a summary of their results in this report. Consequently, with the addition of the eight subjects used by Hull and Huse, the following chapters contain the report of research carried out on thirty subjects.

These subjects were divided into groups in the course of the experimentation and each of these groups will be described separately. In order to facilitate the presentation and interpretation of the data each of these groups has been numbered, the numbering, however, being entirely arbitrary and for convenience in arranging the data in Chapters V and VI only.

*Group 1.* The main experimental group consisted of eight subjects who were either college seniors or students in the graduate schools. In a preliminary test of their reactions to suggestions of postural sway it was found that they gave a prompt and positive response. It was assumed, on this basis, that the trance could be easily induced and there was no difficulty in doing so. No attempt was made to induce a very profound trance while training this group. As an assurance that

they were actually in the trance, however, all of them were tested for catalepsy of the eyelids and limbs. It was found to be necessary to give them two or three training periods of about 20 minutes each in order to secure these catalepsies with sufficient promptness and certainty to justify using them as subjects in an experiment. Amnesia for events occurring in the trance was not considered necessary for these experiments but it was found that five of the subjects developed amnesia during the course of the experimentation. This seems to have occurred quite spontaneously as no effort was made to induce it on the part of the experimenter. The other three subjects continued to go into a light trance throughout. The data obtained from this group are given in Tables 3, 4, 5, and 6 of Chapter V.

*Group 2.* This group consisted of six subjects all of whom were freshmen. Four of these subjects had been previously used by the writer in the preliminary work for another experiment which required hypnotic amnesia. In order to secure a uniform degree of trance for the entire group the other two subjects were also trained to go into a deep trance. The entire group, accordingly showed a complete amnesia for all events occurring in the trance and were consequently judged to be in a deep trance. The second technique described in Chapter III was used by the writer in experimenting with this group and the results are given in Tables 9 and 10 of Chapter VI.

*Group 3.* The subjects used in this group were the same as those used in Group 2. The results obtained from this group of subjects by the use of the modified technique were the opposite of those obtained by Hull and Huse so they were tested by the same technique as had been used by these writers and the original conditions were duplicated as closely as possible. Accordingly, Miss Helen N. Hope undertook to test their responses to suggestions of postural sway with the use of the original Hull-Huse technique thus duplicating the conditions of the original experiment as far as technique was concerned, i.e., the sway test was used as a separate experiment and not as one of a larger series of experiments as was the case when the writer tested these subjects. The further fact that the testing in the original Hull-Huse experiment was done

by a woman was also duplicated. In this way all the essential conditions of the original experiment were duplicated in detail except that one-half of the original subjects were women. Miss Hope's experimentation was undertaken after the writer had finished his testing of the subjects. They showed the same depth of trance for Miss Hope as they did for the writer. The data obtained by this second testing are given in Table 7 of Chapter V.

*Group 4.* A brief statement concerning the subjects used by Hull and Huse is taken from their report and given in order to facilitate reference to them. The group consisted of eight subjects half of whom were men and the other half women. All of them were students at the University of Wisconsin. They had been repeatedly hypnotized and all of them went into a deep trance. The actual testing was done by Miss Huse. The data published by the original experimenters are summarized in Table 8 of Chapter V.

*Group 5.* This group consisted of eight subjects who served as a control group. Both the undergraduate and graduate schools of the university were represented. They were selected on account of the fact that they did not normally respond to suggestions of postural sway when first tested. In order to act as a control to the trance reaction to suggestions of postural sway, it was necessary to find a group that (1) did not go into the trance when they were submitted to the same procedure as the subjects who went into the trance and (2) did not normally respond to suggestions of postural sway. After instructing this group to simulate both the characteristics of trance behavior and a positive response to suggestions of postural sway, they could then be submitted to the procedures for inducing the trance and given suggestions of postural sway with the assurance that their responses were simulated in both cases. The results obtained in this way would act as a control in the interpretation of the data obtained from the subjects who went into the trance and responded normally to suggestions of postural sway. The data obtained from this group are given in Table 11 of Chapter VI.

The chronological order in which these groups were tested is not the same as the sequence in which the data are presented. The first tests to be carried out were those by the use of the modified technique on Group 2. While Miss Hope was

retesting this same group, then called Group 3, the writer was also testing Group 1. Finally Group 5, the control group, was tested. These experiments were carried out in the period from January to May, 1930.

## CHAPTER V

### *Data*

The tables in this and the following chapter present all the data obtained from the experiments. In this chapter the results obtained from Group 1 are presented first. Next come the results from Group 3 on their reaction to suggestions of postural sway which were obtained by Miss Hope with identically the same technique as that used by the writer with Group 1. A retabulation was also made of the data published by Hull and Huse (7) for the reaction of a group of eight subjects to suggestions of postural sway and referred to as Group 4. These results were obtained under conditions comparable with those of the two other experiments reported on in this chapter and are added for the confirmation they give of the results of the other experiments. Finally, the data from these three experiments when combined into a single series and statistically analyzed are presented.

In order to facilitate the understanding of the data the entire performance of each group of subjects is presented separately. The tables are arranged so as to show the data obtained by measuring the time taken to respond on the original records of the postural sway tests and the number of responses in the case of the other experiments. The tables are thus made up directly from the actual records and sheets used in the experimentation and furnish a complete set of original data from which any further computations may be made. The arrangement of the data in the tables is explained on page 25.

From such an arrangement of the data it is possible to obtain the following results directly:

1. *Comparative suggestibility* in which the normal and trance behavior will be compared in order to determine whether the trance affects the suggestibility of the subjects in any way. This is the primary purpose of the investigation. This measure is obtained by comparing the composite means of the first and second normal tests with a similar composite mean of the first and second trance tests. In this way a direct comparison can be made between the mean performance of all subjects in all the normal tests with their mean performance on all the trance tests. These means are shown in the

tables together with the difference between the means and the probable error of this difference. Finally the critical ratio obtained by dividing the difference by its probable error is given.

2. *Cumulative effect* in which the performance on the two tests in the normal and trance states, respectively, will be compared to determine the effect of previous stimulation in a given state upon subsequent stimulation in the same state, i.e., whether a second response differs from a first one when all conditions are kept constant and with only a short interval of time elapsing between. This measure is obtained by a comparison of the mean performance of all subjects on all their first normal tests with their mean performance on all the second normal tests and similarly for the first and second trance tests.

3. *Perseverative effect* which will show whether there is any effect due to responding to stimulation in a given state upon similar responses in another state subsequent to the first, i.e., whether responding to stimulation in the trance will affect behavior in a subsequent normal state and vice versa. It will be recalled that one-half of the normal tests preceded the trance tests and the other half followed. The arrangement was comparable for the trance tests. It will also be recalled that a period of 15 mins. was allowed to elapse between the tests in the two states so that the measure of perseveration used in this study indicates not only the perseveration of one state to the other but also the amount of perseveration persisting after a period of 15 mins. had elapsed between the two states. A measure of such perseveration can be obtained by computing the mean performance of all subjects on the normal tests coming before the trance tests and comparing this with that of the normal tests coming after the trance tests. Comparable means can be obtained for the trance tests. Thus for the subjects in Section I, Table 3, the days on which the normal tests preceded the trance tests are the first and fourth. On the second and third days the normal tests were taken after similar tests in the trance state. This order is, of course, reversed in Section II.

4. *Practice effect* which will show any tendencies analogous to the curves of learning which are characteristic of habit formation. Two measures can be obtained from the data given in the

tables. One of these shows practice in day-by-day performance and the other shows practice for the four tests in the order in which they were given on each experimental day irrespective of whether the normal or trance tests came first. The measure of practice in day-by-day performance is obtained by adding all the data on the four tests given to all the subjects on their first experimental days and finding a mean for this first day's performance. A similar mean is obtained for the second, third and fourth days, respectively. The measure of practice for the tests within each day is obtained by getting the mean performance on all the first tests on all days irrespective of whether this was in the normal or trance state and similarly for the second, third and fourth tests respectively. When a graph is plotted from the results obtained in this way, the curve provides an illuminating parallel to the cumulative and perseverative effects although it is not identical as the normal and trance tests are not separated in obtaining the means. A comparison between the means of the first and second tests and those of the third and fourth tests, respectively, closely parallels the results given under cumulative effect. Likewise, if the results of the first and second tests are taken together and compared with the combined results of the third and fourth tests it almost corresponds to a graphical representation of the perseverative effect.

The probable error of the difference was obtained by using the following formula (19:9) :

$$P.E._D = .67449 \sqrt{\frac{\sigma_1^2 + \sigma_2^2 - 2r\sigma_1\sigma_2}{N}}$$

### I(A)

All the measurements of the time of response to suggestions of postural sway for Group 1 are shown in Table 3.

On the second, third and fourth experimental days Subject No. 7 did not respond to suggestion in the normal state and consequently time values have to be interpolated for these tests. The values to be interpolated were decided upon by finding the average time of all his other responses and doubling this. This approximates rather closely the longest response time recorded for this subject viz. 47.5 secs. which occurred in the trance state. The actual period of stimulation in these cases was 180 secs. and the interpolated values represent a minimum

TABLE 3  
SHOWING THE TIME, IN SECONDS, TAKEN BY EVERY SUBJECT IN GROUP I TO RESPOND TO SUGGESTIONS OF POSTURAL SWAY ON ALL TESTS  
TOGETHER WITH THE DATES ON WHICH THE TESTS WERE MADE AND THE SEQUENCE OF THE TESTS FOR EACH DAY.

Section	No.	Subject	Date	Sequence of Tests	Time in seconds			
					1st Test	Normal	2d Test	1st Test
I	1	Sc	3-13 3-17 3-18 3-21	A B B A	14.0 8.5 6.0 8.0	8.5 5.0 6.0 6.0	14.0 12.5 7.5 7.0	11.0 9.0 5.5 6.0
	2	A	3-17 3-19 3-20 3-21	A B B A	14.5 12.5 12.5 9.0	11.0 12.0 10.5 9.5	12.0 14.5 17.0 9.5	10.5 12.5 14.0 11.5
	3	Ca	3-10 3-13 3-18 3-19	A B B A	46.0 37.0 67.5 114.0	36.5 35.0 29.5 43.5	15.0 21.0 85.0 30.0	16.0 23.0 35.5 24.0
	4	Sh	3-1 3-3 3-4 3-5	A B B A	44.0 29.0 27.0 55.5	35.5 14.5 22.0 18.0	17.5 16.0 25.5 18.5	11.0 13.0 15.5 10.0
II	5	H	3-10 3-11 3-13 3-14	B A A B	13.0 14.0 16.0 7.0	9.5 11.5 9.0 6.5	15.0 8.0 6.5 7.0	12.5 6.0 9.5 5.5
	6	R	3-14 3-17 3-21 3-24	B A A B	36.0 24.5 18.0 8.5	43.5 21.0 12.0 7.0	17.5 4.5 6.0 6.5	10.5 6.0 5.0 4.5
	7	Ch	3-6 3-7 3-10 3-12	B A A B	25.5 50.0* 50.0* 50.0*	10.0 50.0* 50.0* 50.0*	25.5 22.0 26.0 16.5	15.5 47.5 18.5 15.0
	8	W	3-17 3-20 3-21 3-22	B A A B	50.0 52.0 38.5 35.5	35.5 38.0 34.0 26.0	65.5 39.5 25.5 36.5	47.0 38.5 26.0 21.0
				Sums	993.5	716.5	650.5	516.5
				Means	31.047	22.391	20.328	18.24
				Composite Means				
				Diff.P.E. <sub>a</sub>				
				D/P.E. <sub>b</sub>				4.2

\*Values interpolated for periods when the subject did not respond in the normal state. See text, p. 34.

rather than a maximum value for failure to respond. It is obvious that when a subject responds in the trance state and fails to do so in the normal state the difference is an infinite one and this minimum time of 50 secs. was decided upon so that this one subject should not unduly affect the results obtained from the group.

(1) *Comparative suggestibility.* A comparison of the composite mean of all responses in the normal state with that for the trance responses indicates that the response is 8.5 secs. faster on the average in the trance than in the normal state. The  $P.E_D$  is 2.0 and the ratio  $D/PE_D$  is 4.2 which means that this is a highly reliable difference. The chances are only 1 in 400 that this is an unreliable difference. There is thus a saving of 32% of the normal response time when the stimulation is given in the trance state.

From this table it is also possible to show that the first trance response is 65.4% as long as the first normal response and the second trance response is 72.1% as long as the second normal response.

(2) *Cumulative effect.* By comparing the mean time of response for the first normal test with that for the second normal test, the latter is found to be only 72.1% as long as the former. A similar comparison for the mean of the first trance test and the second trance test reveals the latter to be 79.5% as great as the former. This shows that the time taken to respond to suggestion a second time under identically the same conditions as the first but with a period of one and one-half minutes intervening, is reduced by about one-fourth. No great difference is shown in this respect between the trance and normal state.

(3) *Perseverative effect.* When the mean time of response for all trance tests preceding the normal tests, 20.25 seconds, is compared with a similar mean for all trance tests given after the normal tests, 16.20 seconds, it is found that the latter is 80.0% as long as the former. A comparison of the mean time of response of the normal tests preceding the trance, 30.06 seconds, with the mean of the normal tests after the trance, 23.38 seconds, shows that the latter is 77.8% as great as the former. These results correspond rather closely and seem to indicate that the perseverative effect of responding

twice to suggestions persists for at least 15 minutes to a very appreciable extent. There is again a very close correspondence between the perseverative effect of the normal and trance state.

(4) *Practice effect.* The data presented in Table 3 show a clear case of practice effect especially in the mean performance for the separate tests given each day. The mean time of the first day's tests is 23.41 seconds and that of the fourth day's tests is 21.33 seconds, the latter being 91.1% of the former. When, however, the mean of all the first tests on all the experimental days, 29.89 seconds, is compared with that of the fourth tests, 18.11 seconds, the latter is found to be only 60.6% of the former. These results are shown graphically in Fig. 7.

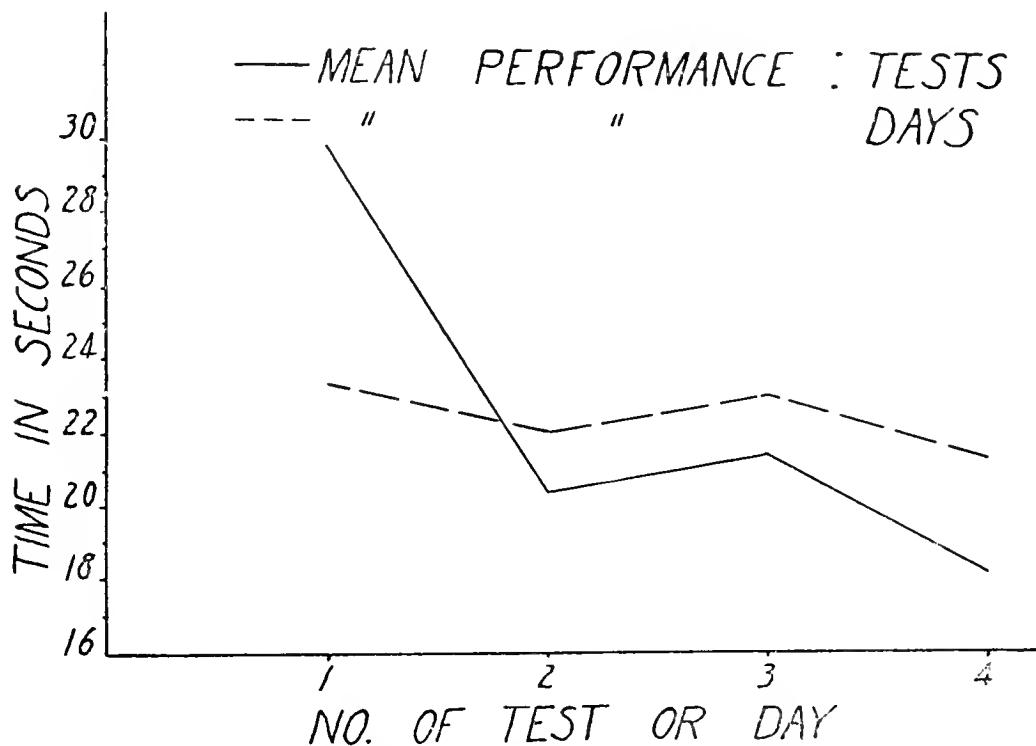


FIG. 7. Graph of data from Group 1 showing practice effects in responding to suggestions of postural sway.

The data obtained from the experiment with the lines are given in Table 4.

(1) *Comparative suggestibility.* The data presented in Table 4 show that when the composite mean number of lines judged longer than the preceding one for the normal state is compared with that of the trance state, no appreciable differ-

## 38 SUGGESTIBILITY IN NORMAL AND HYPNOTIC STATES

TABLE 4\*  
SHOWING, FOR LINES NOS. 6-15, THE NUMBER OF TIMES A LINE WAS JUDGED LONGER THAN THE PRECEDING ONE BY EACH SUBJECT IN GROUP I  
ON ALL TESTS TOGETHER WITH THE DATES ON WHICH THE TESTS WERE MADE AND THE SEQUENCE OF THE TESTS FOR EACH DAY.

Section	No.	Subject	Date	Sequence of tests		Normal		France		Number of responses		
				1st Test	2d Test	1st Test	2d Test	1st Test	2d Test			
1	Sc		3-22	B	3	3	7	7	4	4		
			3-24	A	4	1	3	3	3			
			3-25	A	4	3	3	3	2			
2	A		3-27	B	2	4	5	5	4	4		
			3-22	B	3	2	1	1	0			
			3-24	A	2	0	2	2	3			
3	Ca		3-20	B	5	6	4	4	5	5		
			3-21	A	5	3	1	1	4			
			3-22	A	1	3	5	5	4			
4	Sh		3-24	B	4	4	5	5	5	5		
			3-10	B	6	1	1	1	3			
			3-13	A	2	0	2	2	1			
5	H		3-14	A	0	0	3	3	1	6		
			3-15	B	0	0	1	1	0			
			3-20	B	5	4	5	5	7			
6	R		3-21	A	3	5	4	4	5	6		
			3-22	A	2	4	3	3	6			
			3-24	B	3	3	4	4	6			
7	Ch		3-25	A	6	6	6	6	4	4		
			3-26	B	7	7	5	5	3			
			3-27	B	4	5	3	3	6			
8	W		3-29	A	5	6	5	5	5	5		
			3-18	A	5	4	5	5	5			
			3-19	B	5	2	3	3	4			
II			3-20	B	2	4	4	4	3	3		
			3-21	A	0	1	4	4	3			
			3-24	A	5	6	7	7	4			
III			3-25	B	7	5	5	5	4	4		
			3-26	B	4	5	4	4	7			
			3-27	A	5	4	5	5	4			
			Sums		113	103	123	120				
			Means		3.531	2.218	3.843	3.750				
			Composite means		3.38							
			Diff:P.E.D									
			D/P.E.D									

\*The sections in this and the following experiments for this group are not equal owing to the fact that a subject withdrew after the preliminary program of research had been arranged.

$$.42 \pm .175$$

$$2.417$$

ence is found in the degree of suggestibility, the difference being only .42 in favor of greater suggestibility in the trance. However, this slight difference has a PE of only .17 and a D/PE<sub>D</sub> ratio of 2.4 which, while not a reliable difference, is still corroborative of the general results of the experiments reported in this monograph. With this ratio the chances are 1 in 20 that the real difference lies in the opposite direction. These results are shown graphically in Figure 8. It will be noticed that the graph shows a uniformly increased suggestibility for lines 6-11. Separate calculations were made from the data derived from lines 6-10 as it seemed as if the difference between the normal and trance scores is obscured by the data derived from lines 12-15. The data from lines 6-10 have a mean difference of  $.44 \pm .19$  and the D/PE<sub>D</sub> ratio is 2.3 showing that the reliability of the difference for this part does not differ from that of the whole.

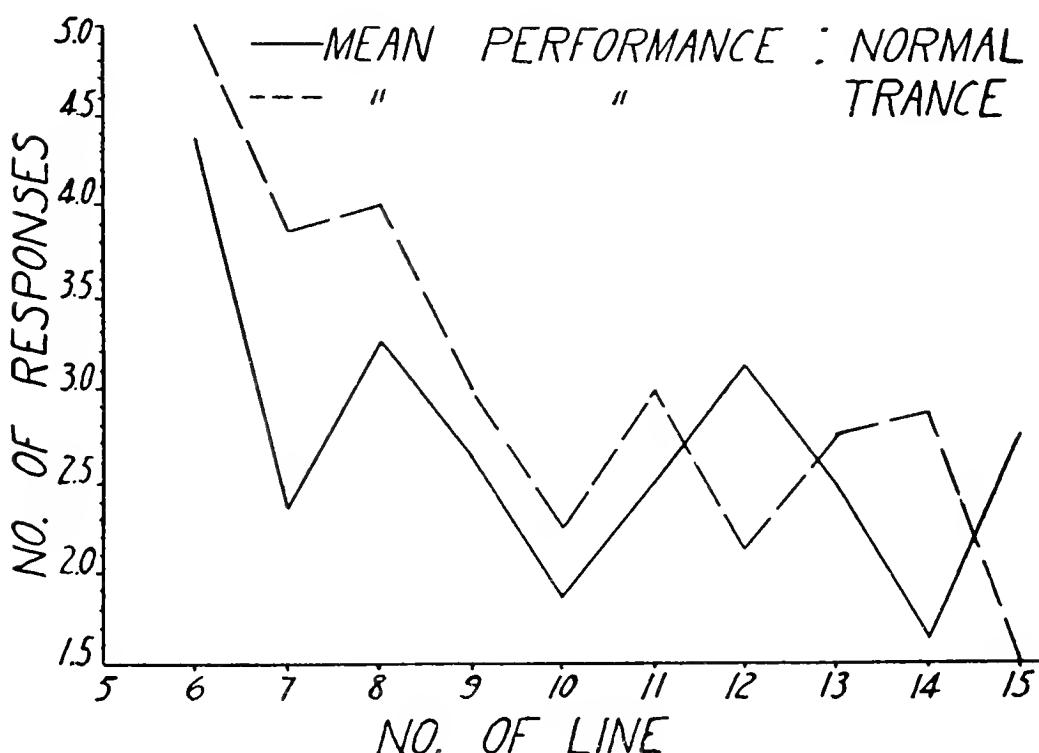


FIG. 8. Graph of data from Group 1 showing comparative suggestibility on the line experiment.

(2) *Cumulative effect.* A comparison of the mean number of lines judged longer in the first normal test with that of the second normal test shows that the latter is 91.1% as great as the former. A similar comparison for the trance tests

shows that in the second test 97.6% as many lines were judged longer as in the case of the first test. In both cases there is more accuracy of judgment, or less suggestibility, in the second test. This is the opposite to what was found in the case of postural sway although the difference is small and probably not a significant one.

(3) *Perseverative effect.* The mean number of lines judged longer for all trance tests preceding the normal tests is 1.97 and for all trance tests taken after the normal tests, the mean is 1.83 which shows that the latter is 92.9% of the former. Similarly, the mean for the normal tests preceding the trance tests is 1.53 and for those after the trance is 1.84 making the latter 120.3% of the former. These two results do not agree and the data available are not adequate to solve the discrepancy.

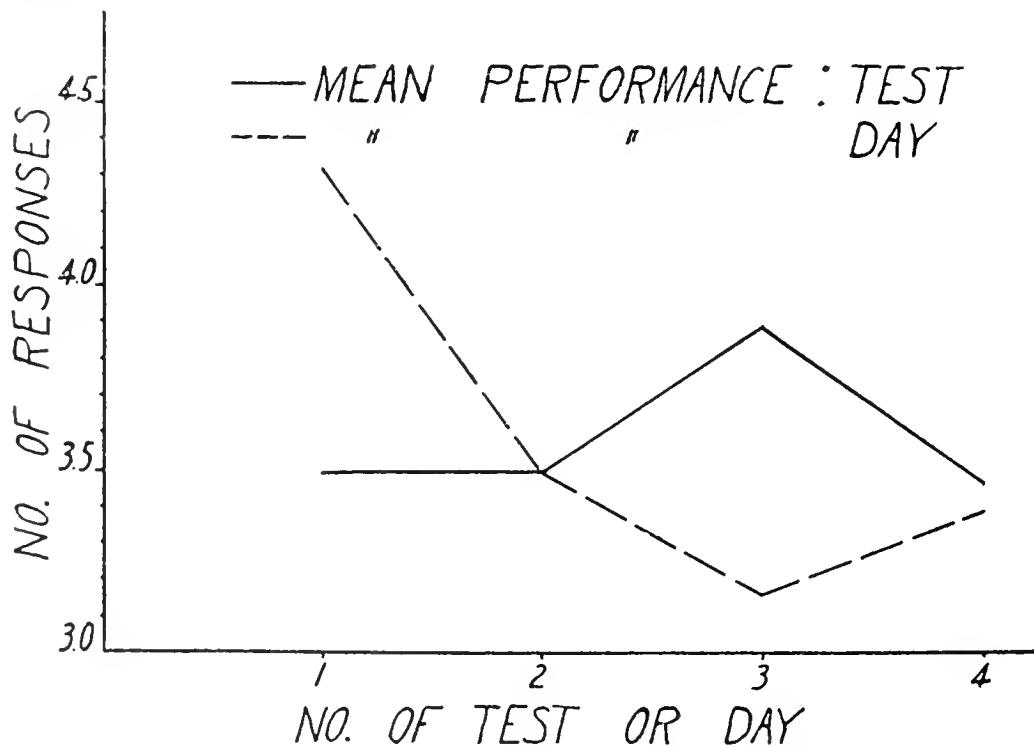


FIG. 9. Graph of data from Group 1 showing practice effect in responses to the line experiment.

(4) *Practice effects.* From an examination of Figure 9 it will be seen that day by day practice in this experiment leads in general to decreased suggestibility when the data from the entire series of lines Nos. 6-15 are considered. The effect of repeated response to suggestion within a given day shows no marked effect, except that there is an increase in suggestibility

on the third test (after the 15 minute waiting period) which is characteristic of the other curves obtained from a similar arrangement of the data.

When, however, a graph of the data for lines 6-10 only is plotted as in Fig. 10 a very clear practice effect is shown in the day by day results. The mean of the fourth day, 7.75 lines, is 78.5% of that of the first day, 9.88 lines, while the mean of the third day, 6.5 lines, is only 65.8% of that of the first day. A reversal is apparent, however, when the mean of the fourth test, 8.38 lines, is compared with that of the first test, 8.13 lines, where the latter is 103.1% of the former.

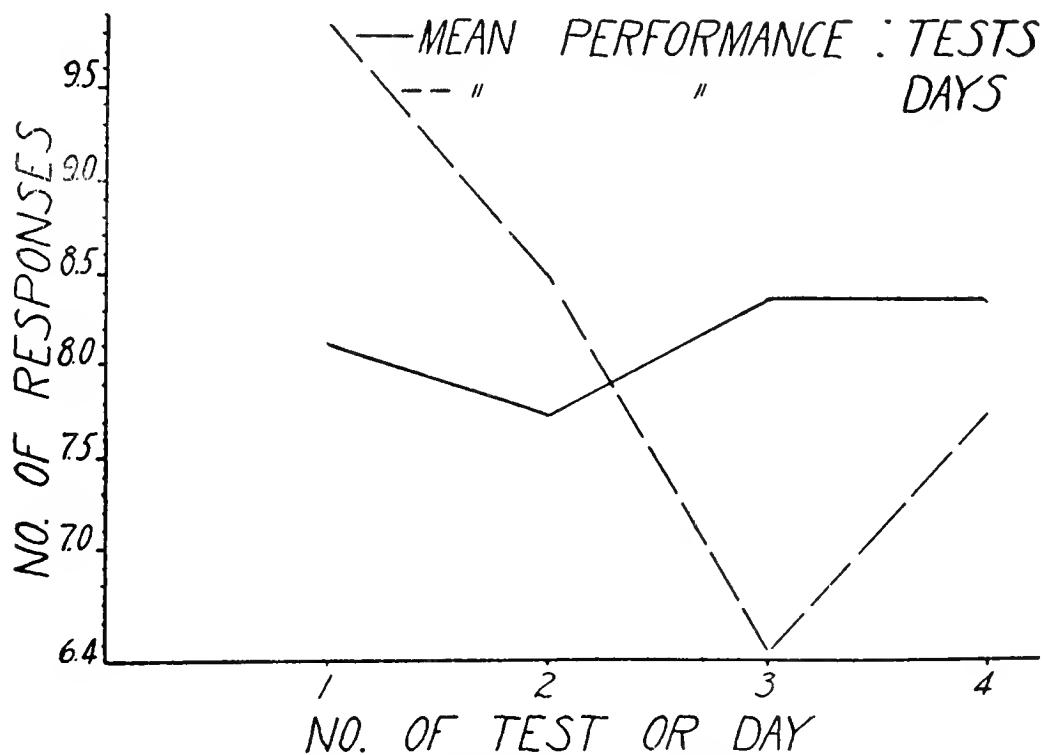


FIG. 10. Graph of data from Group 1 showing practice effects in responses to lines Nos. 6 to 10 inclusive.

### I(C)

The data from the experiment with the weights are given in Table 5.

(1) *Comparative suggestibility.* The data presented in Table 5 show that when the composite mean number of weights judged heavier than the preceding one for all normal tests is compared with that for all trance tests the former is 84.2% of the latter. The difference between these means of .68 showing heightened suggestibility in the trance is, however, a

TABLE 5

SHOWING FOR WEIGHTS NOS. 6-15, THE NUMBER OF TIMES A WEIGHT WAS JUDGED HEAVIER THAN THE PRECEDING BY EACH SUBJECT IN GROUP I ON ALL TESTS TOGETHER WITH THE DATES ON WHICH THE TESTS WERE MADE AND THE SEQUENCE OF THE TESTS FOR EACH DAY.

Section	No.	Subject	Date	Sequence of tests			Normal			Trace				
				1st Test	2d Test	3d Test	1st Test	2d Test	3d Test	1st Test	2d Test	3d Test		
I	1	Sc	4-22	A	3	3	4	3	3	4	4	4		
			4-23	B	3	4	4	3	3	4	4	4		
			4-24	B	2	4	4	1	1	5	5	5		
			4-25	A	3	4	4	4	4	7	7	7		
2	2	A	4-25	A	5	5	5	5	5	4	4	4		
			4-28	B	2	1	1	1	0	0	0	0		
			4-29	B	1	1	1	0	0	0	0	0		
			4-30	A	1	2	2	1	1	0	0	0		
3	3	Ca	3-25	A	3	6	6	8	8	8	8	8		
			3-26	B	4	5	5	5	5	6	6	6		
			3-27	B	6	5	5	6	6	5	5	5		
			3-29	A	4	4	4	4	4	6	6	6		
4	4	Sh	3-20	A	3	2	2	4	4	4	4	4		
			3-21	B	1	1	1	2	2	1	1	1		
			3-22	B	0	1	1	0	0	0	0	0		
			3-24	A	0	1	1	0	0	1	1	1		
5	5	H	3-25	A	3	4	4	4	4	5	5	5		
			3-27	B	3	5	5	5	5	7	7	7		
			3-29	B	3	3	3	7	7	6	6	6		
			3-30	A	0	2	2	6	6	3	3	3		
6	6	R	4-21	B	4	5	5	5	5	5	5	5		
			4-22	A	5	3	3	5	5	5	5	5		
			4-23	A	5	5	5	5	5	4	4	4		
			4-24	B	4	3	3	4	4	5	5	5		
II	7	Ch	3-24	B	3	4	4	4	4	5	5	5		
			3-25	A	6	7	7	5	5	7	7	7		
			3-26	A	5	7	7	6	6	4	4	4		
			3-27	B	3	2	2	1	1	2	2	2		
8	8	W	4-22	B	4	5	4	4	4	4	4	4		
			4-23	A	5	7	7	7	7	8	8	8		
			4-25	A	5	6	6	8	8	8	8	8		
			4-26	B	7	10	10	5	5	7	7	7		
			Sums		106	128	133	144	144					
			Means		3.312	4.000	4.156	4.500	4.500					
			Composite means		3.65					4.33				
			Diff:P.E.D							.68 ± .1997				
			D/P.E.D							.3404				

fairly reliable one as the  $PE_D$  is .199 and the ratio  $D/PE_D$  is 3.4 making the chances less than 1.5% that it is an unreliable difference. The results are shown graphically in Figure 11.

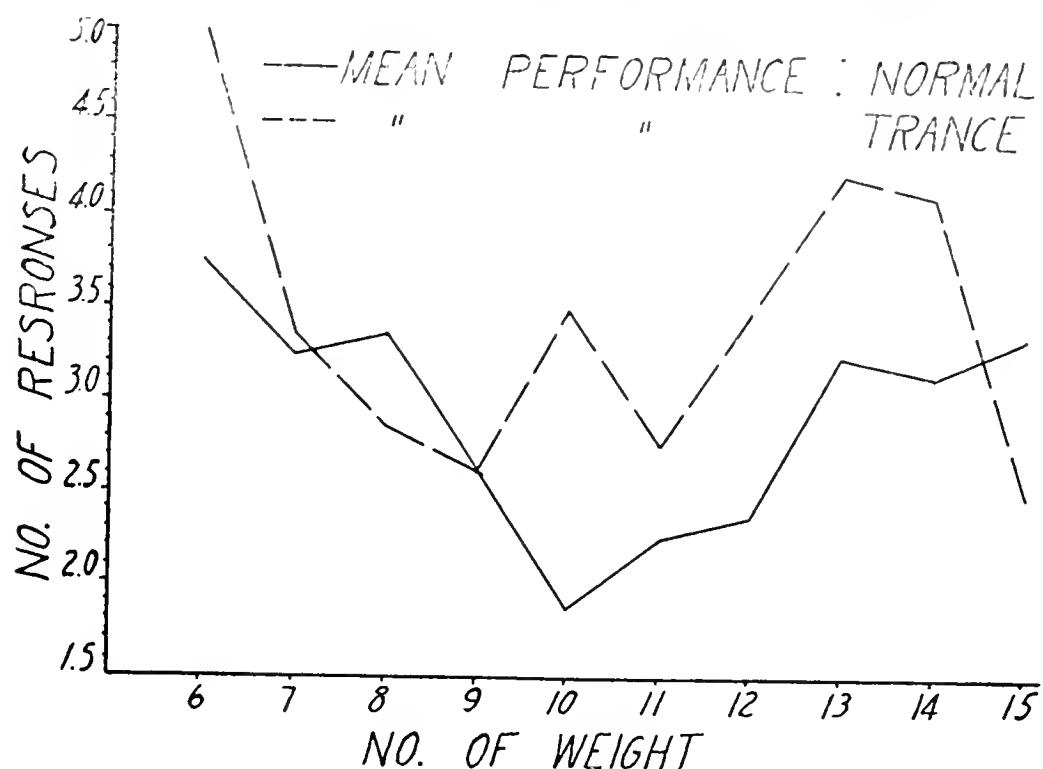


FIG. 11. Graph of data from Group 1 showing practice effect in response to the weight experiment.

(2) *Cumulative effect.* When comparing the mean number of weights judged heavier in the first normal test with that of the second normal test it is found that the latter is 120.8% of the former. A similar trace of cumulative effect is found when the mean number of weights judged heavier in the first trance test is compared with that of the second trance test, the latter being 108.2% of the former. The tendency shown in these results is for suggestibility to increase slightly when a test is repeated a second time within a short period after the first, this, of course, being shown by the fact that the subjects judge more weights to be heavier than the preceding ones in the second tests in both the normal and trance states.

(3) *Perseverative effect.* The mean number of weights judged heavier in the trance tests preceding the normal, 3.81, when compared with that of the trance tests after the normal, 4.81, shows that the latter is 126.2% of the former. When the mean of the weights judged heavier in the normal tests

preceding the trance, 3.88, is compared with that of the normal tests after the trance, 3.44, it is found that the latter is 88.7% of the former. It will be noticed that these results are the reverse of what was found to be the case with the lines.

(4) *Practice effects.* In Figure 12 the day by day practice curve shows that there is some learning in accuracy in judging the weights, this, however, being an indication of a decrease in suggestibility. The mean for the fourth day, 3.31, when compared with that of the first day, 4.38, shows an increase in accuracy of judgment of 24.4%, the former being 75.6% of the latter. However, when the mean of the fourth test on a given day, 4.31, is compared with that of the first test, 3.53, it is found that the former is 122.1% of the latter, which indicates that there is presumably some increase in suggestibility when the test is repeated under the conditions of this experiment.

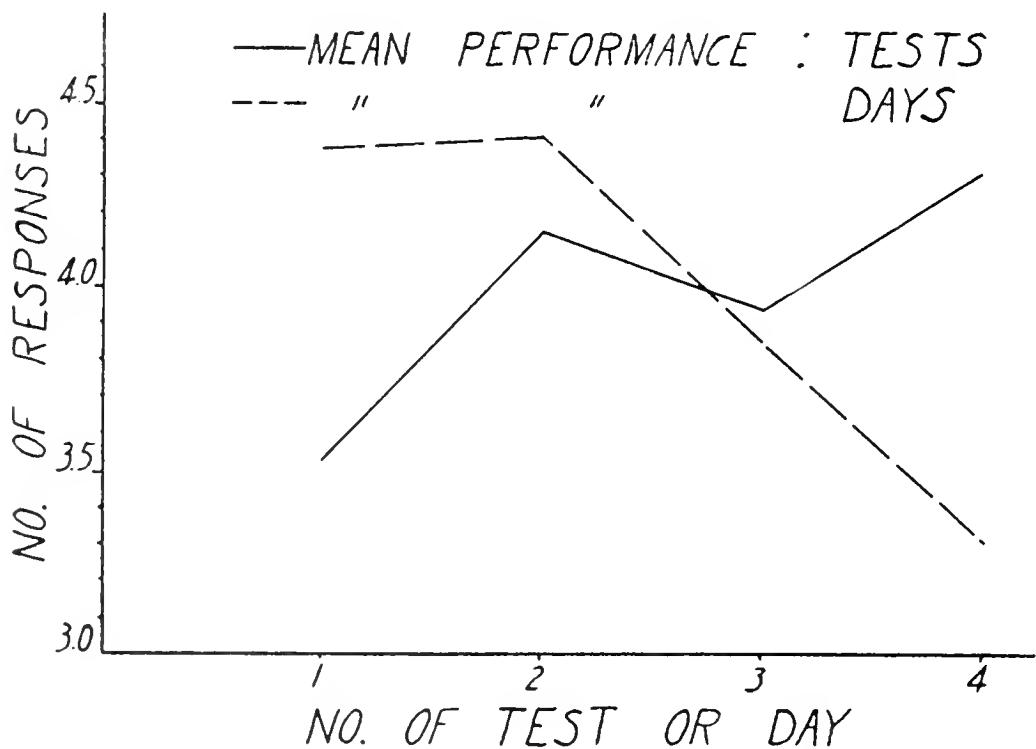


FIG. 12. Graph of data from Group 1 showing practice effect in responses on the weight experiment.

### I(D)

The data obtained from the experiment with the heated coil are given in Table 6.

TABLE 6

SHOWING, FOR STIMULATIONS NOS. 5-10, THE NUMBER OF TIMES A REACTION WAS MADE TO A SUGGESTION OF WARMTH BY EACH SUBJECT IN GROUP I ON ALL TESTS TOGETHER WITH THE DATES ON WHICH THE TESTS WERE MADE AND THE SEQUENCE OF THE TESTS FOR EACH DAY.

Section	No.	Subject	Date	Sequence of tests	Number of responses					
					1st Test	Normal 2d Test	1st Test	Trance 2d Test		
I	1	Sc	5-9	B	2	1	1	1		
			5-10	A	0	1	0	0		
			5-12	A	0	0	0	0		
			5-13	B	0	1	2	3		
2	2	A	5-1	B	6	6	4	6		
			5-5	A	6	6	6	6		
			5-6	A	6	6	6	6		
			5-7	B	6	6	6	6		
3	3	Ca	4-19	B	6	6	6	6		
			4-22	A	6	6	6	6		
			4-23	A	6	6	6	6		
			4-24	B	6	6	6	6		
4	4	Sl	5-2	B	6	6	5	6		
			5-3	A	4	2	4	5		
			5-5	A	6	6	6	4		
			5-6	B	4	1	0	1		
5	5	H	Unable to serve for this experiment							
			4-25	A	5	6	6	6		
			4-26	B	6	6	6	6		
			4-29	B	6	6	6	6		
II	7	Ch	5-1	A	6	6	6	6		
			Unable to serve for this experiment							
			4-28	A	0	2	0	0		
			4-29	B	1	0	1	0		
8	8	W	4-30	B	2	2	0	2		
			5-1	A	1	0	2	2		
			Sums							
					97	94	91	96		
Means				4.041	3.916	3.791	4.000			
Composite Means				3.98			3.90			
Diff.P.E.D							.08 ± .328			
D/P.E.D								.243		

(1) *Comparative suggestibility.* When the composite mean number of times a reaction was made to suggested warmth in the normal tests is compared with that in the trance tests, the former is found to be 102.1% of the latter. The difference between the two is so small, however, that it is evident that this experiment does not show any difference in suggestibility between the two states. The difference of .08 has a  $PE_D$  of .328 and the ratio  $D/PE_D$  is .243 showing it to be an entirely unreliable difference. These facts are shown graphically in Figure 13.

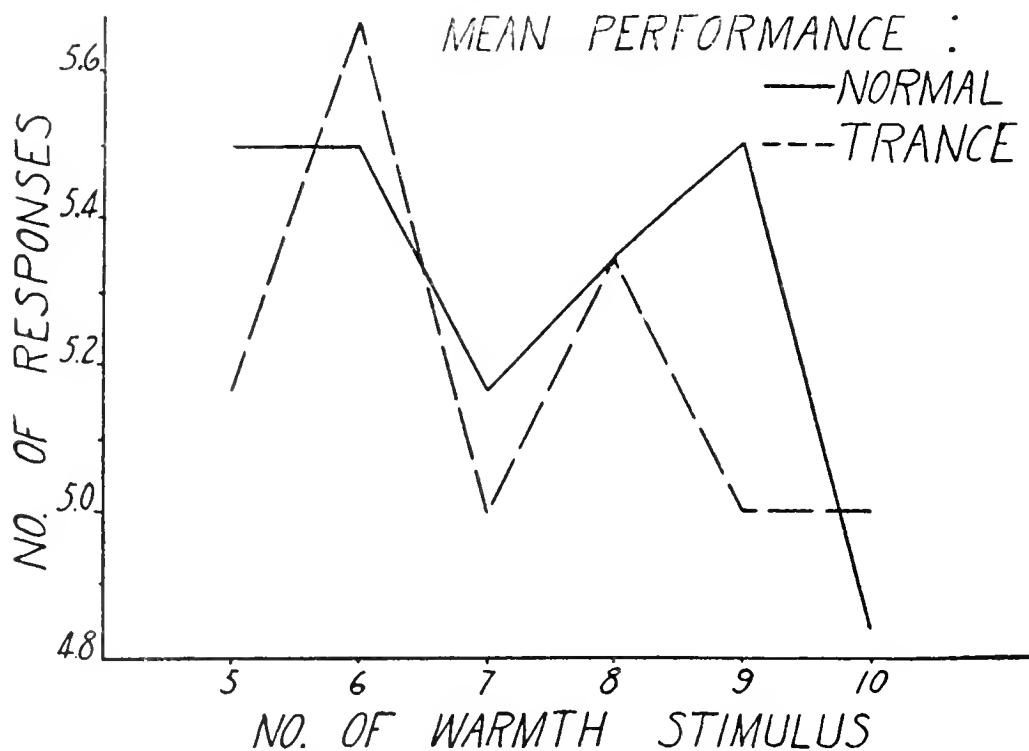


FIG. 13. Graph of data from Group 1 showing comparative suggestibility on the warmth experiment.

(2) *Cumulative effect.* A comparison of the mean number of reactions in the first normal test, with that in the second normal test shows the latter to be 96.9% of the former. A similar comparison for the mean number of reactions of the first trance test with that of the second trance test shows the latter to be 105.5% of the former. There is no clear cumulative effect shown by this experiment.

(3) *Perseverative effect.* The mean number of reactions of the trance tests taken before the normal ones is 3.83 and the mean of those after the normal tests is 3.96, which makes the

latter 103.3% of the former. Again, the mean number of reactions to suggestion in the normal tests preceding the trance tests is 3.88 and for the normal tests after the trance tests the mean is 4.08, which makes the latter 105.4% as great as the former. When the two means are as closely equal as this it is evident that there is no significant perseverative effect shown in this experiment.

(4) *Practice effect.* Figure 14 represents the data obtained from this experiment arranged so as to show any learning or practice effect both for day by day learning and for the several tests within a given day.

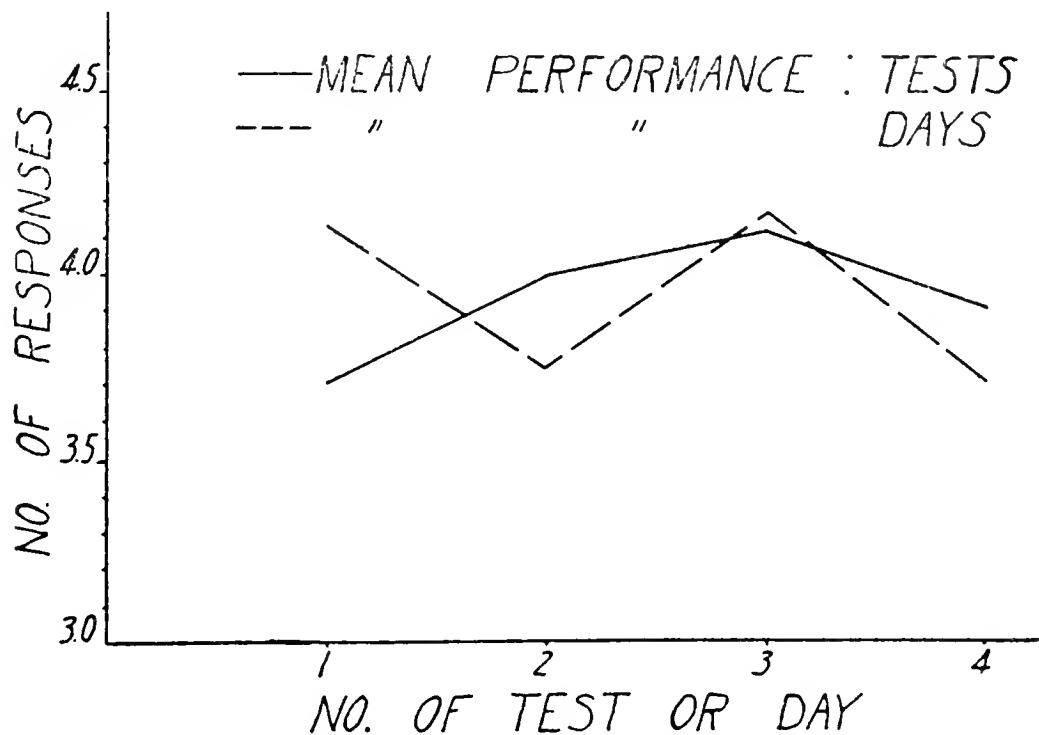


FIG. 14. Graph of data from Group 1 showing practice effect in responses on the warmth experiment.

It is evident that no generalized conclusion can be drawn. The rise shown for the third day is not explained within the limits of this experiment, but is probably due to chance.

All the results obtained from this experiment are inconclusive. The difference in all computations has been very small and in the case of comparative suggestibility it is also entirely unreliable.

## II

The data obtained by Miss Hope from testing Group 3 are presented in Table 7.

TABLE 7  
SHOWING THE TIME, IN SECONDS, TAKEN BY EVERY SUBJECT IN GROUP 3 TO RESPOND TO SUGGESTIONS OF POSTURAL SWAY ON ALL TESTS TOGETHER WITH THE DATES ON WHICH THE TESTS WERE MADE AND THE SEQUENCE OF THE TESTS FOR EACH DAY.

Section	No.	Subject	Date	Sequence of Tests	Time in seconds					
					1st Test	Normal	2d Test	1st Test		
I	1	T	2-24	A	10.0	21.0	12.0	7.0		
			2-25	B	14.0	16.0	14.0	12.0		
			2-26	B	16.0	15.0	14.0	10.0		
			2-27	A	15.0	9.0	9.0	13.0		
2	2	B	2-25	A	5.5	6.0	4.0	3.0		
			2-26	B	3.0	3.0	4.0	2.0		
			2-28	B	3.5	2.5	4.5	3.0		
			3-1	A	3.5	3.5	2.5	3.0		
3	3	C1	3-10	A	18.5	17.0	20.0	18.0		
			3-21	B	14.5	12.0	14.5	14.0		
			3-28	B	12.0	12.0	9.5	8.5		
			4-15	A	6.5	7.5	6.0	7.5		
4	4	Co	2-25	B	11.0	9.5	13.0	9.5		
			2-26	A	14.0	11.0	11.0	10.5		
			2-27	A	11.5	12.0	9.5	5.0		
			2-28	B	13.0	9.0	8.0	8.0		
II	5	M	3-6	B	6.0	5.0	4.5	4.0		
			3-7	A	5.0	6.5	5.0	5.0		
			3-10	A	5.5	5.0	8.0	5.0		
			3-11	B	7.0	5.5	4.5	4.5		
6	6	L	4-14	B	4.5	4.0	4.0	3.5		
			4-15	A	2.0	4.0	5.0	2.0		
			4-16	A	6.0	3.5	1.5	.5		
			4-17	B	2.0	1.0	3.5	1.5		
				209.5	200.5	191.5	160.0			
				8.78	8.55	7.98	7.35			
								6.67		
								4.2		
								1.20 ± .28		

(1) *Comparative suggestibility.* When the data in Table 7 are examined it is found that if the composite mean time of all responses in the normal state is compared with that in the trance state the response is 1.2 secs. faster on the average in the trance than in the normal state. The mean trance time is thus 85.9% of the mean normal time showing a decrease of 14.1% on the time of response in the trance state. The  $PE_D$  is 0.283 and the ratio  $D/PE_D$  is 4.2 which means that the chances are 1 in 400 that this is an unreliable difference. This is an entirely satisfactory reliability and the general agreement of the difference with the other results reported for work on postural sway warrant the assumption that this is characteristic of the trance.

Similarly, the mean time of response on the first trance test is 91.4% of that on the first normal test and the time on the second trance test is 79.9% of that on the second normal test.

(2) *Cumulative effect.* A comparison of the mean time of response for the first normal test with that of the second normal test shows the latter to be 95.6% of the former. Similarly when the mean time of response of the first trance test is compared with that of the second trance test, the latter is shown to be 83.6% of the former. These results agree in general with those obtained from Group 1. They show, however, a considerable decrease in the amount of cumulative effect. The reason for this decrease in cumulative effect is not clear. It is fairly evident, however, from the large amount of practice effect shown in these data that it is not due to the fact that the subjects had been tested by the writer previous to their work with Miss Hope and had thus reached the plateau in the practice curve.

(3) *Perseverative effect.* When the mean time of response of all trance tests preceding the normal, 7.44 secs, is compared with that of all the trance tests after the normal, 7.21 secs., the latter is found to be 96.9% of the former. Again when the mean time of response for all normal tests preceding the trance, 8.71 secs., is compared with that of all the normal tests after the trance, 8.38 secs., the latter is found to be 96.2% of the former. These results correspond so closely that the conclusion is warranted that the perseveration is the same whether the normal or trance tests are the preceding ones.

(4) *Practice effect.* The data presented in Table 7 show a very clear case of practice effect especially in the day by day performance of the subjects. The mean time of the first day's tests is 9.19 secs. as compared with 6.40 secs. for the fourth day's tests. There is thus an average shortening of 2.79 secs. or 30.4% in the time of response. A similar learning effect is shown in the performance of these subjects when the mean time of response of the first test, 8.38 secs., is compared with that of the fourth test, 7.25 secs. There is an average shortening of 1.13 secs. or 13.5% in the time of response. These results are shown graphically in Figure 15.

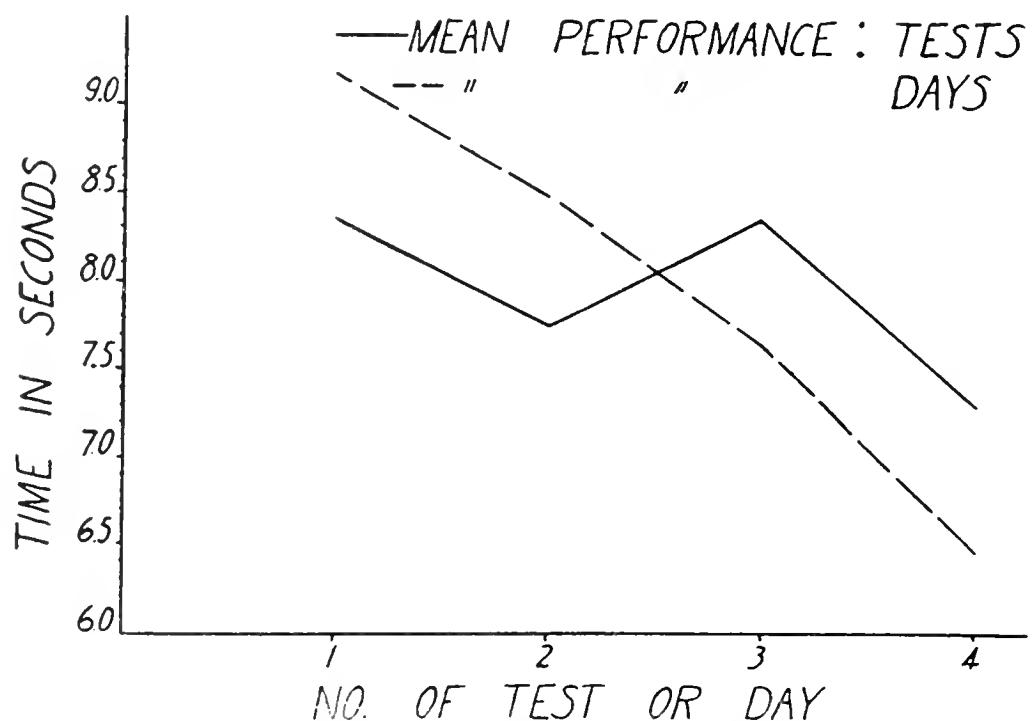


FIG. 15. Graph of data from Group 3 showing practice effect in responding to suggestions of postural sway.

### III

Reference has already been made to the experiment carried out by Hull and Huse (7) which bears a very close relationship to the work reported here. The technique was identical in every way with that used in the two experiments previously reported in this chapter. Because of this relationship and the further information they bear on the questions raised in this study, the salient features of the data will be reviewed here.

In reporting the results of their experiment, the writers found it necessary to interpolate values for one of the subjects

who did not respond in three of the normal tests. The experimenters interpolated values of 150 secs. for these tests. The general effect of these interpolations on the results was to accentuate the tendency of the subjects to be more suggestible in the trance than in the normal state. Suggestions were continued for 180 secs. in every case but in order to minimize any undue emphasis due to these interpolations, and thus prevent any single subject from unduly influencing the conclusion, it seemed best to interpolate values derived in the same way as those reported for Subject No. 7 in Group 1 (p. 34.) Accordingly, values of 105 secs. were substituted for those of 150 secs. This is about twice the mean time of this subject on all the tests, 51.5 secs., and only 5 secs. longer than his maximum time of 100 secs. The sums and means of the columns after this change has been made are shown in Table 8. These are in every way comparable with the sums and means at the bottom of Table 3. By the use of this table and reference to the original article it is possible to interpret the data in a manner exactly comparable to that adopted for the other data in this chapter.

TABLE 8  
SUMMARY OF RESULTS REPORTED BY HULL AND HUSE (7) ON THEIR EXPERIMENT WITH SUGGESTIONS OF POSTURAL SWAY.

	Normal		Trance	
	1st Test	2d Test	1st Test	2d Test
Sums	861	654	383	292
Means	26.93	20.44	11.97	9.12
Composite means	23.68		10.66	
Diff.:PE <sub>D</sub>		13.02	= 2.71	
D/PE <sub>D</sub>			4.80	

(1) *Comparative suggestibility.* This summarizing table shows that the mean time taken by this group of subjects to respond in the normal state was 23.68 secs. and in the trance state it was 10.66 secs., making the trance time 45.1% of the normal with a mean difference of 13.02 secs. in the time taken to respond. The PE<sub>D</sub> is 2.71 and the ratio D/PE<sub>D</sub> is 4.8 which assures the reliability of this difference. These results agree rather closely with the other results obtained by this technique.

The table also shows that the mean time of response on the first trance test is only 44.4% as long as that of the first normal test. Similarly the mean time of response on the

second trance test is only 44.6% as long as that on the second normal test.

(1) *Cumulative effect.* A comparison of the mean time taken to respond in the first normal test, with that of the second normal test shows that the latter is 75.9% as long as the former. Similarly, when the mean time taken to respond to the first trance is compared with that of the second trance test, the latter is shown to be 76.2% as long as the former. These results show a shortening in time of response of about one-fourth when the two tests are given under the same conditions and are separated by a period of only one and one-half minutes, a result which is almost identical with that obtained from Group 1.

(3) *Perseverative effect.* For the trance tests preceding the normal the mean time of response is 9.53 secs. and for the trance tests coming after the normal it is 11.56 secs., the latter being 121.3% of the former. The mean time of response for all normal tests preceding the trance tests is 29.28 secs. and that of the normal tests coming after the trance is 18.06 secs., which shows the latter to be 61.7% of the former. This discrepancy cannot be solved by reference to the data in which it appears.

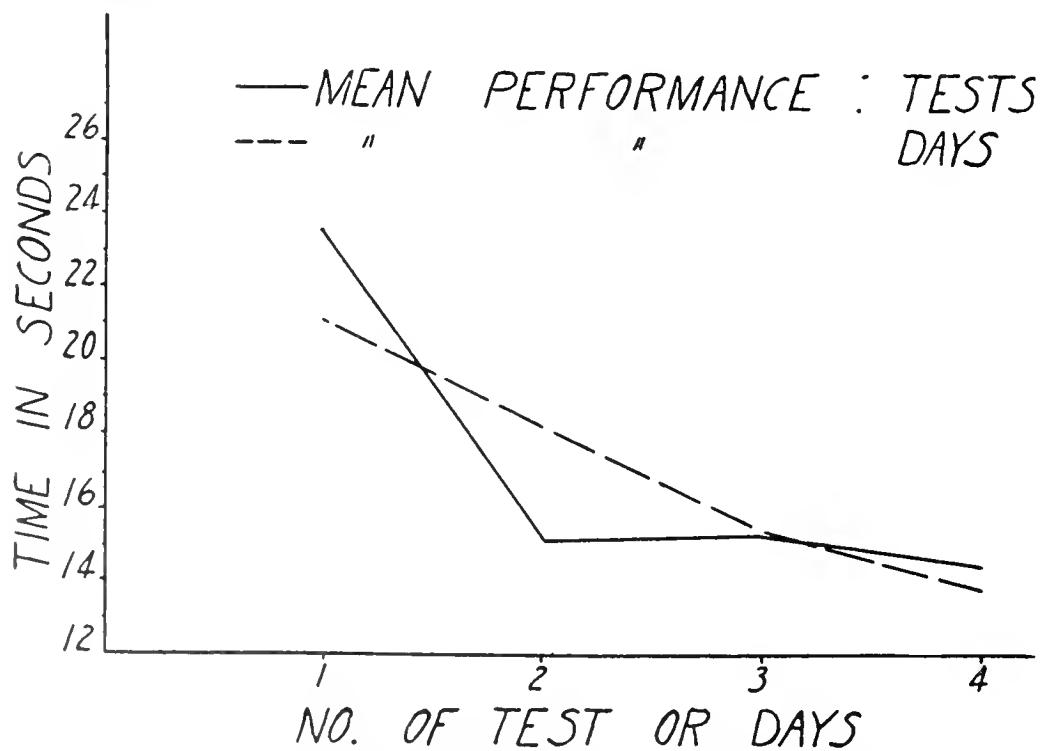


FIG. 16. Graph of data from Group 4 showing practice effect in responding to suggestions of postural sway.

(4) *Practice effect.* After the new values were interpolated the amount of practice shown in the data is represented in Figure 16. When the mean time of response on the first day, 21.13 secs., is compared with that for the fourth day, 13.72 secs., it is evident that the latter is only 64.9% of the former, a shortening of 35.1% of the time. Similarly when the mean time of response of the first test, 23.56 secs., is compared with that of the fourth test, 14.31 secs., the latter is only 60.7% of the former, a shortening of 39.3% of the time.

#### IV

The data on postural sway that have been presented in the preceding sections of this chapter are alike in that they were all obtained by the same technique. Two of the groups, Groups 1 and 3, were also tested in the same room and under identically the same conditions, except for the fact that the experimenter was changed. Furthermore, all three groups of data are alike in showing a heightened suggestibility in the trance state. In view of this uniformity of technique and results, the three groups were combined into a single series and the reliability of the difference between the time of response in the normal and trance state was computed. This was done by finding the per cent difference between the time of response of the individual subjects in the normal and trance states. This gave a single percentage index for each of the twenty-two subjects. All except two of these showed a shortened time of response in the trance state. The mean of this series was 67.3%, *i.e.*, the mean time of response for the trance state was 67.3% of that of the normal state. The per cent difference between the times of response in the two states, therefore, is 32.7% ( $100\% - 67.3\%$ ). The PE of this difference is 2.67 and the ratio  $D/PE_D$  is 12.22. Such a ratio, of course, indicates an unquestionable increase of suggestibility in the trance to the extent that suggestibility is measured by the technique used in this series of experiments. These data also provide an index of the degree of increase of suggestibility produced by placing a subject in a hypnotic trance. In general it can be said that a person is about 33% more suggestible in the trance than he is in the normal state.

## CHAPTER VI

### *Data Continued*

Two other experiments remain to be reported on in this chapter. These are the experiments with a group of six subjects, Group 2, in which a modified technique was used as described on p. 27 and the experiment with a group of eight control subjects, Group 5, who were used as a control for the results obtained by the postural sway technique in the experiments reported on in the last chapter. The control subjects, however, did not go into the trance but were instructed to simulate the trance as described on p. 15. These two experiments, the first and last respectively in the chronological sequence of the series of experiments, furnish data which form an illuminating comment upon the general conclusions to be derived from the previous chapter.

Owing to the different technique used with Group 2 it is impossible to obtain some of the measures used in the previous chapter. It is impossible, *e.g.*, to secure a measure of perseverative effect from the data on postural sway as the subjects were not always able to return after a regular interval of twenty-four hours as is shown in the date column of Table 9, and furthermore, there is no adequate reason to believe that the type of perseverative effect represented by the index used in the last chapter will be found to be effective after a lapse of twenty-four hours or more. Similarly, the fact that a long and somewhat irregular interval intervened between the tests and the further fact that only one test was made each experimental day on the lines, weights, warmth and touch make it impossible to secure a measure of either perseverative or cumulative effect for these experiments. Furthermore, the fact that only one test was given each day makes it impossible to secure a measure of practice effect as shown by the response to more than one test within a given day.

#### I (A)

The data in Table 9 represents the reactions of Group 2 to suggestions of postural sway and the table is in every way comparable to those previously given except that the normal and trance tests were given on separate days as indicated in the date columns and explained on p. 26.

TABLE 9

SHOWING THE TIME, IN SECONDS, TAKEN BY EVERY SUBJECT IN GROUP 2 TO RESPOND TO SUGGESTIONS OF POSTURAL SWAY ON ALL TESTS TOGETHER WITH THE DATES ON WHICH THE TESTS WERE MADE AND THE SEQUENCE OF THE TESTS FOR EACH DAY.

Section	No.	Subject	Date	Sequence of Tests	Time in seconds					
					1st Test	Normal	2d Test	1st Test		
1	M		1-16 : 1-17	A	6.0	6.0	6.5	5.0		
			1-20 : 1-21	B	4.0	6.5	10.0	6.0		
			1-22 : 1-23	B	5.0	3.0	3.0	4.5		
			1-24 : 1-28	A	4.0	3.5	5.0	4.5		
2	B		1-13 : 1-14	A	12.0	4.5	5.5	8.0		
			1-20 : 1-21	B	8.5	6.0	8.5	4.5		
			2-4 : 2-5	B	7.0	5.0	7.0	4.5		
			2-6 : 2-7	A	5.0	5.0	5.5	4.0		
3	C1		1-14 : 1-15	A	15.0	18.0	27.0	16.0		
			1-16 : 1-20	B	10.5	13.0	16.5	15.0		
			1-28 : 1-29	B	6.5	6.5	12.0	8.5		
			1-30 : 1-31	A	14.5	10.0	13.5	2.5		
4	T		1-10 : 1-11	B	9.0	8.0	8.5	10.0		
			1-13 : 1-14	A	6.5	6.0	12.0	9.0		
			1-15 : 1-16	A	5.0	7.0	7.5	9.5		
			1-17 : 1-18	B	9.5	5.5	9.5	4.5		
5	L		1-13 : 1-15	B	9.5	5.0	13.5	12.0		
			1-16 : 1-17	A	5.0	5.0	4.5	5.5		
			1-18 : 1-20	A	4.0	3.0	5.0	3.0		
			1-22 : 1-23	B	3.0	2.5	3.5	4.0		
6	Co		1-10 : 1-11	B	10.0	9.5	17.5	19.0		
			1-13 : 1-14	A	20.0	16.0	8.5	12.5		
			1-15 : 1-16	A	14.5	15.0	14.5	11.0		
			1-17 : 1-18	B	11.5	13.5	12.0	9.0		
				Sums	205.5	183.0	236.5	192.0		
				Means	8.562	7.625	9.854	8.000		
				Composite Means	8.11		8.98			
				Diff: P.E. <sub>D</sub>		.82 ± .32				
				D/P.E. <sub>D</sub>		2.6				

(1) *Comparative suggestibility.* The data in Table 9 show immediately that there is a change in the performance of this group of subjects with the accompanying change in technique. Whether this difference in results is due to the change in technique or not cannot be decided by the data presented here. When the mean time of response on all the normal tests, 8.11 secs., is compared with that of all the trance tests, 8.93 secs., it is obvious that this group of subjects take longer to respond in the trance than in the normal state. The mean trance time is 110.1% of the mean normal time. The difference of .82 secs., has a PE of .317 and the ratio  $D/PE_D$  is 2.6, which, while not thoroughly reliable, at least warrants a considerable amount of presumption that the true difference lies in the same direction. With a critical ratio of 2.6 the chances are 1 in 25 that it is an unreliable difference.

Both the first and second trance tests have a longer response time than the corresponding normal tests, the first trance test being 115.1% of the first normal and the second trance test being 104.9% of the second normal test.

(2) *Cumulative effect.* Cumulative effect is shown in these data for both the normal and trance tests. When the mean time of response for the first normal test is compared with that of the second normal test, the latter is shown to be only 89.1% of the former and similarly the mean time for the first trance test when compared with the mean of the second trance test shows the latter to be only 81.2% of the former. It is noteworthy that while the results for comparative suggestibility are reversed in this experiment the data still show a clear case of cumulative effect which seems to be one of the most characteristically uniform results of the entire group of experiments reported in this monograph.

(3) *Practice effect.* Figure 17 represents graphically the data from this experiment when arranged so as to show day by day learning which has been found characteristic of all the other experiments. It will be recalled that the pairs of normal and trance tests were made separately on eight experimental days rather than together on four experimental days as was the case with all the other experiments. This fact explains the change in the X-axis of the graph from those given in the preceding chapter.

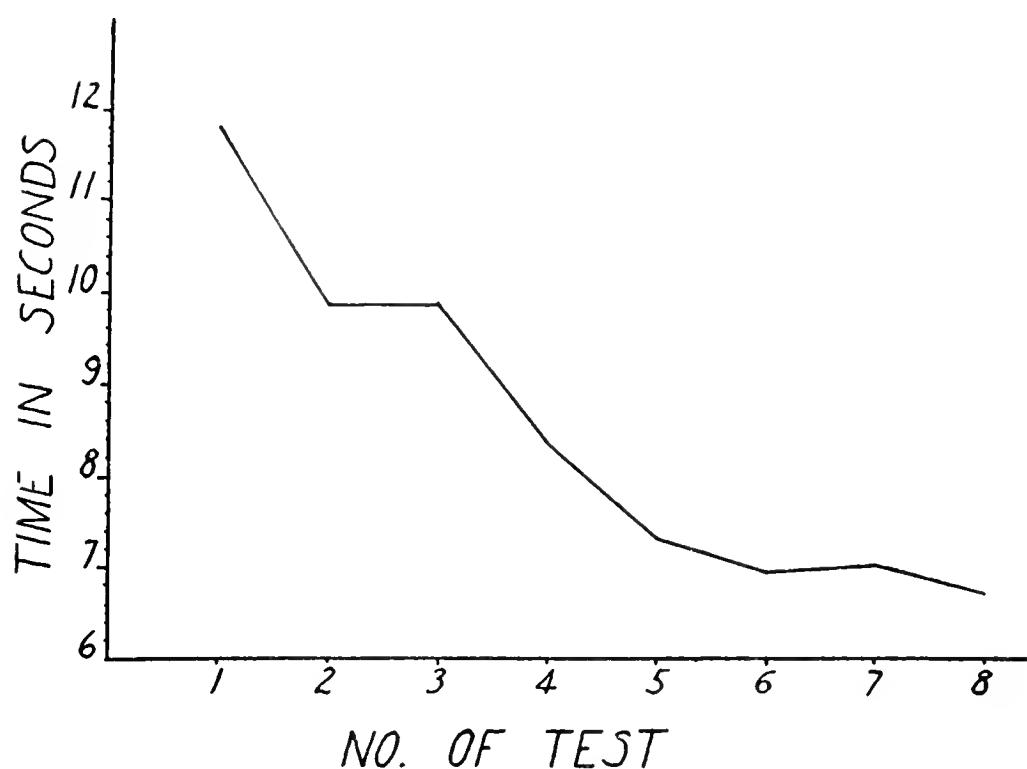


FIG. 17. Graph of data from Group 2 showing practice effect in responding to suggestions of postural sway.

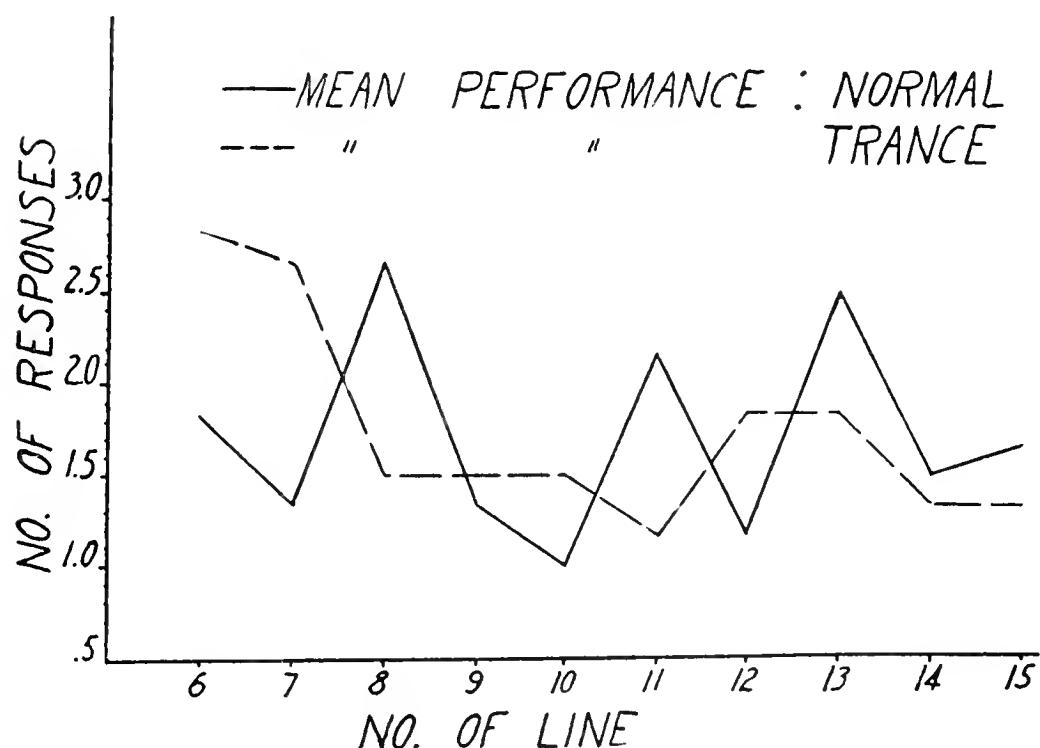


FIG. 18. Graph of data from Group 2 showing comparative suggestibility on the line experiment.

TABLE 10  
SHOWING THE NUMBER OF RESPONSES MADE BY EVERY SUBJECT IN GROUP 2 ON ALL TESTS IN THE EXPERIMENTS ON THE LINES,  
WEIGHTS, WARMTH AND TOUCH. THE DATES AND SEQUENCE OF TESTS ARE THE SAME AS THOSE GIVEN IN TABLE 9.

Section	No.	Subject	Number of responses					
			Lines	Normal	Weight	Normal	W <sup>a</sup> rmth	Normal
			Trance	Trance	Trance	Trance	Trance	Touch
1	1	M	5	5	8	6	5	6
	2	B	5	4	6	6	6	2
	3	C1	5	5	5	3	4	1
4	4	T	4	4	7	6	6	1
	5	L	5	4	7	6	5	0
	6	Co	3	2	7	6	6	0
II	7		6	4	7	6	0	0
	8		5	4	6	4	0	0
	9		5	7	4	5	3	0
III	10		3	3	6	5	5	0
	11		5	3	6	6	5	3
	12		1	4	6	4	6	4
IV	13		3	2	5	6	5	2
	14		4	4	2	4	1	5
	15		3	4	5	3	0	0
V	16		4	4	5	4	3	0
	17		5	5	4	3	1	0
	18		5	6	3	1	2	0
Sums			104	104	143	124	90	23
Means			4.333	4.333	5.958	5.166	3.75	2.5
Diff:P.E. <sub>D</sub>			0	0.79 ± .074	0.25 ± .013	0.25 ± .013	0.958	1.041
D/P.E. <sub>D</sub>				10.765	0.274	0.274	0.08 ± .034	2.472

The graph in Figure 17 is very typical of one of the commonly observed types of practice curve. The diminution in time of response is both rapid and steady. The mean for the first test is 11.83 secs. and that of the last test is 6.71 secs. the latter being 56.7% of the former. This means that there is a shortening of 43.3% of the original time by repeating the tests twice on each of eight experimental days.

### I(B)

In Table 10 the reaction of Group 2 to the line experiment is tabulated.

(1) *Comparative suggestibility.* The data given for reaction to the lines shows no difference in suggestibility, the means of the normal and trance tests being exactly alike. These data are shown graphically in Figure 18.

(2) *Practice effect.* Figure 19 is a graphical representation of the data when arranged so as to show learning effect.

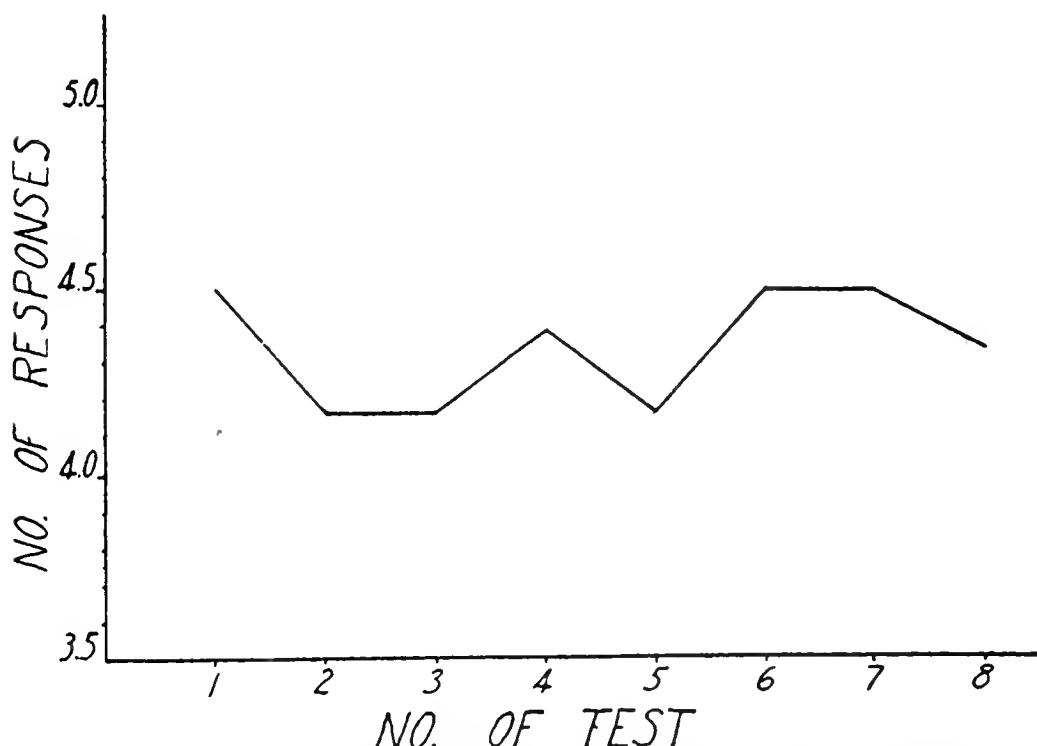


FIG. 19. Graph of data from Group 2 showing practice effect on the line experiment.

There is a total lack of practice effect shown in these data and in this respect the result differs from most of the other results presented in the preceding chapter.

## I(C)

In Table 10 the reactions of this group of subjects to the experiment with the weights are also tabulated.

(1) *Comparative suggestibility.* It will be observed that the data in Table 10 show the subjects to be more suggestible in the normal state than in the trance on this experiment. The mean number of weights judged heavier in the normal tests was 5.96 and in the trance tests it was 5.17, showing a mean increase of .79 for the normal tests. This is not a very large difference but the  $P.E_D$  is only .074 giving a  $D/P.E_D$  ratio of 10.77 which unquestionably establishes the reliability of the difference. This result, in addition to that secured on the postural sway test for this group together with the warmth test for Group 1 are the only results which tend to contradict the general conclusion of this series of experiments. A graph of these data is shown in Figure 20.

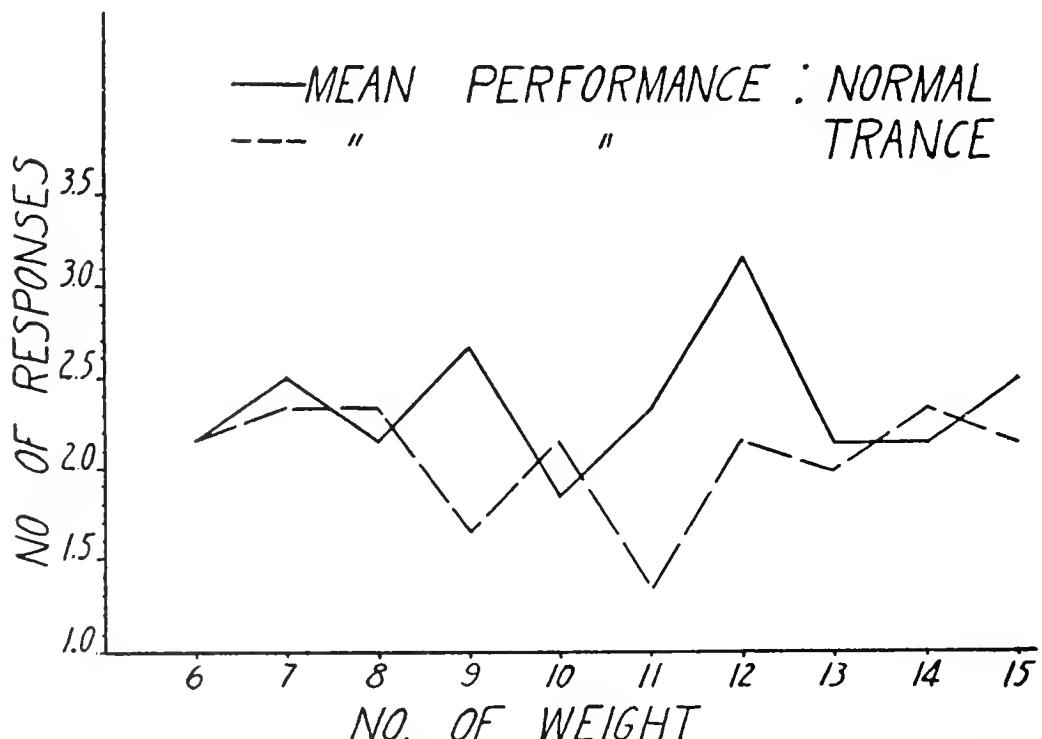


FIG. 20. Graph of data from Group 2 showing comparative suggestibility on the weight experiment.

(2) *Practice effect.* These data are graphically represented in Figure 21 so as to show practice effect. An examination of

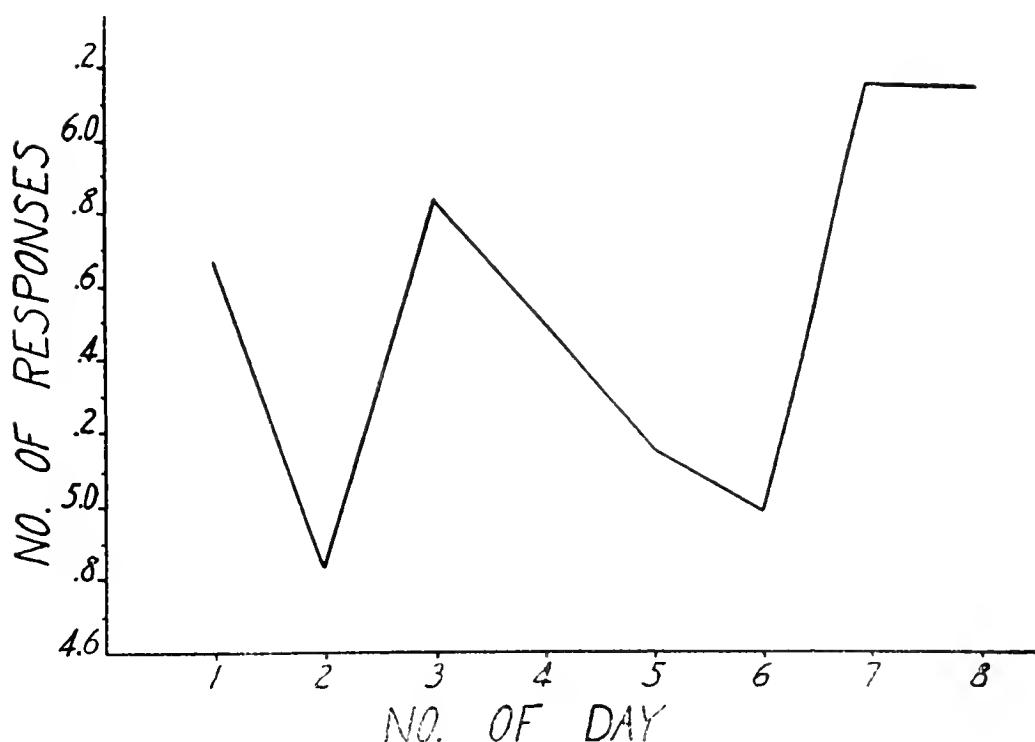


FIG. 21. Graph of data from Group 2 showing practice effects on the weight experiment.

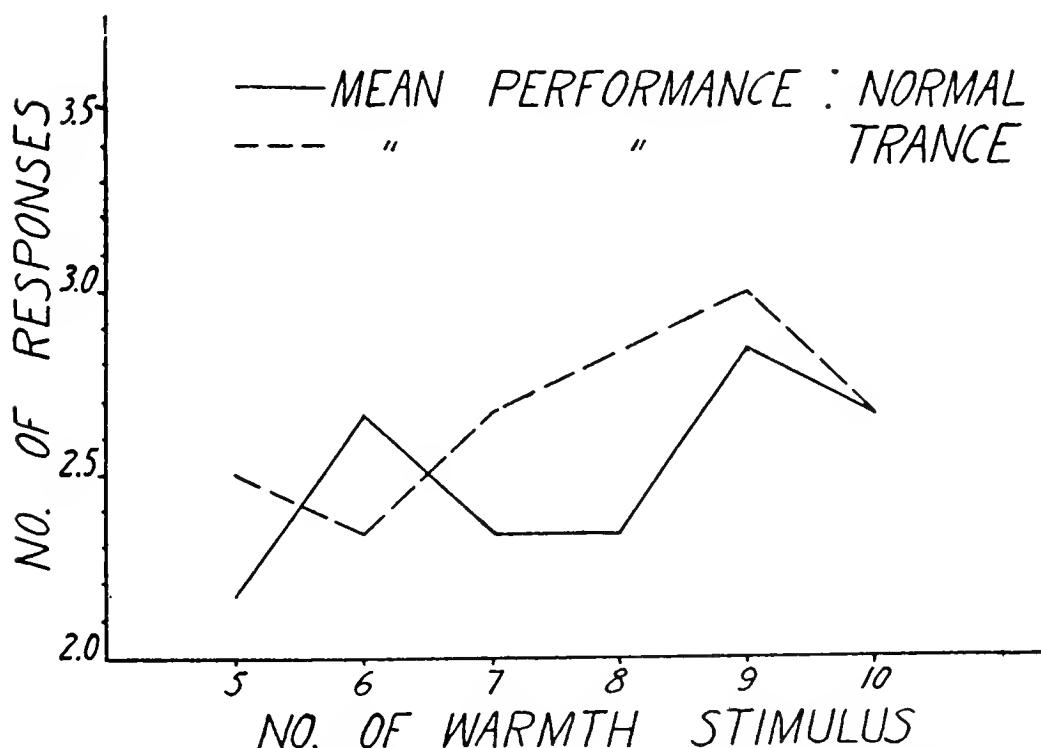


FIG. 22. Graph of data from Group 2 showing comparative suggestibility on the warmth experiment.

the graph will show that there is no very obvious practice effect to be found in these data. If there is any general tendency it is in the direction of an increasing suggestibility with the repetition of the test, i.e., more weights are judged heavier than the preceding one in the last tests than in the first ones.

### I(D)

The data for the experiment with the suggested warmth are also given in Table 10.

(1) *Comparative suggestibility.* A comparison of the mean number of responses made in the normal and trance states shows that the group is slightly more suggestible in the trance, the difference being 0.25. This difference, however, has a relatively large P.E. of 0.913 and the D/P.E.<sub>D</sub> ratio is 0.27 which shows that it is merely a chance difference. These data are represented graphically in Figure 22.

(2) *Practice effect.* These data are represented graphically in Figure 23 so as to show any practice effect.

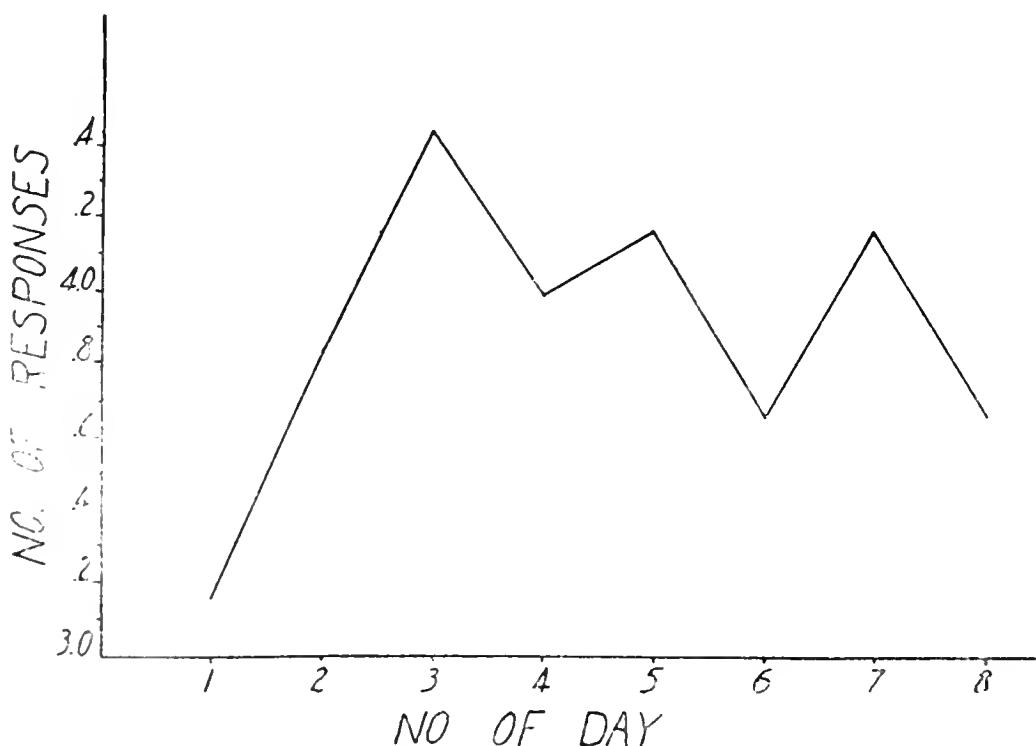


FIG. 23. Graph of data from Group 2 showing practice effect on the warmth experiment.

The graph shows an enormous increase in suggestibility on the second and third day, but this tends to decrease slowly as the experiment is repeated. This may be a real tendency for this experiment but there is no other case of this nature in the results of this series of experiments and the data on which this graph is based are too few to justify any general conclusion.

### I (E)

The data for the experiment with the corks are also given in Table 10.

(1) *Comparative suggestibility.* A comparison of the mean number of responses in the normal and trance states shows that the subjects are slightly more suggestible in the trance state, the difference being 0.083. The P.E.<sub>D</sub>, however, is 0.034 and the ratio D/P.E.<sub>D</sub> is 2.5 which indicates some probability that it is a reliable difference especially as the result agrees with the general conclusion to be drawn from this series of experiments. These results are shown graphically in Figure 24.

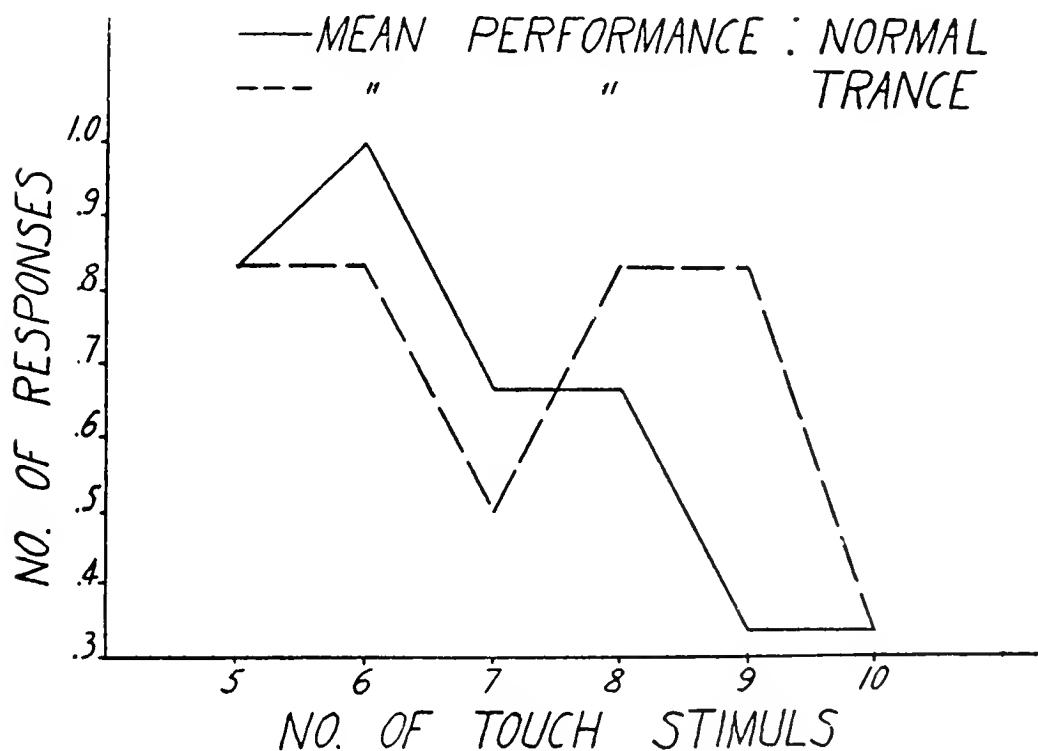


FIG. 24. Graph of data from Group 2 showing comparative suggestibility on the touch experiment.

(2) *Practice effect.* These data are represented graphically in Figure 25 so as to show any practice effect.

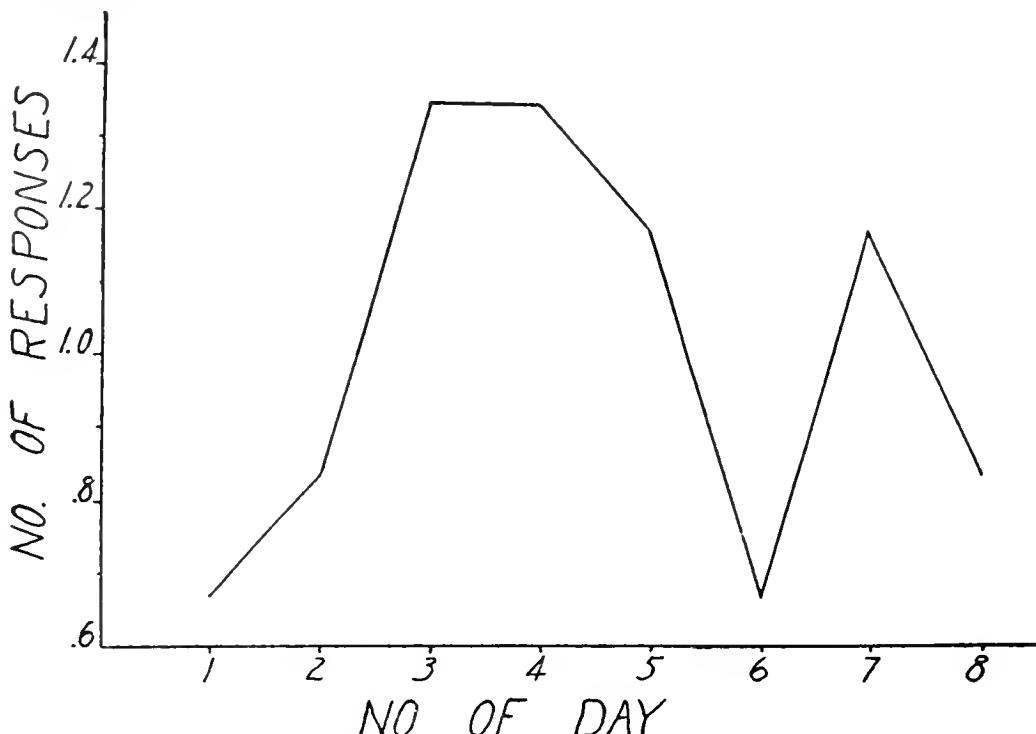


FIG. 25. Graph of data from Group 2 showing practice effect on the touch experiment.

The data from this experiment do not show any clear practice effect. There is no explanation within the limits of this experiment for the increase in suggestibility which occurred on the third and fourth days. It corresponds rather closely, however, to the increase in suggestibility found both with the warmth experiment on the second and third days, with the postural sway experiment on the third and fourth days and with the weights experiment on the third day. There is some presumption, though not amounting to proof, that there was rather a general increase in the suggestibility of this group during the first days of the experiment, the increase, however, being lost during the last half of the experiment.

## II

The data from a group of control subjects, Group 5, remain to be presented. These data are tabulated in Table 11 which is in every way comparable to the tables given in the previous chapter, the arrangement of the tests being the same. A detailed description of the control conditions is found on p. 15.

**SUGGESTIBILITY IN NORMAL AND HYPNOTIC STATES** 65

SHOWING THE TIME, IN SECONDS, TAKEN BY EVERY SUBJECT IN GROUP 5 TO RESPOND TO SUGGESTIONS OF POSTURAL SWAY ON ALL TESTS TOGETHER WITH THE DATES ON WHICH THE TESTS WERE MADE AND THE SEQUENCE OF THE TESTS FOR EACH DAY.

Section	No.	Subject	Date	Sequence of tests	Time in seconds					
					1st Test	Normal	2d Test	1st Test		
1	1	Q	4-25	A	50.0	67.0	28.5	25.0		
			4-26	B	21.0	13.0	32.0	18.0		
			4-29	B	16.0	15.5	22.5	20.0		
			4-30	A	14.5	10.0	12.0	9.5		
2	2	Si	4-25	A	31.5	27.0	22.5	20.0		
			4-28	B	21.0	24.0	18.5	13.5		
			4-29	B	30.5	22.5	17.0	28.0		
			4-30	A	27.5	19.0	16.0	16.5		
3	3	B	5-3	A	52.5	39.0	30.0	33.5		
			5-5	B	38.0	28.0	49.0	56.5		
			5-6	B	18.5	15.0	18.0	15.5		
			5-7	A	12.5	17.0	15.5	11.5		
4	4	O	5-5	A	34.5	30.5	13.5	15.0		
			5-6	B	13.0	13.0	16.0	11.0		
			5-7	B	16.0	12.0	23.5	16.0		
			5-8	A	11.5	10.0	6.5	7.5		
5	5	Sm	5-2	B	72.5	55.0	39.5	75.0		
			5-3	A	40.0	28.0	27.5	30.5		
			5-5	A	26.0	27.5	20.0	23.0		
			5-6	B	29.0	30.5	24.5	24.5		
6	6	Ki	5-6	B	12.0	13.5	13.0	12.5		
			5-8	A	11.5	11.0	9.0	8.0		
			5-9	A	17.0	11.5	15.5	8.0		
			5-10	B	13.5	10.0	12.5	10.0		
II	7	L	5-2	B	14.5	17.0	22.0	4.0		
			5-3	A	38.5	15.5	21.5	18.5		
			5-5	A	18.0	19.0	27.5	13.0		
			5-6	B	23.5	28.0	32.0	23.0		
8	8	Ko	5-2	B	12.5	12.0	18.5	12.5		
			5-3	A	10.5	10.0	13.5	10.5		
			5-5	A	16.0	11.5	14.5	17.0		
			5-6	B	14.0	12.0	13.5	13.0		
					777.5	674.5	665.5	620.0		
					24.296	21.078	20.796	19.375		
					<b>22.71</b>	<b>2.62 ± .71</b>	<b>20.09</b>	<b>3.7</b>		

(1) *Comparative suggestibility.* The data in Table 11 show that this group of control subjects is more suggestible in the state *simulating* a hypnotic trance than in their normal state, a result which raises an important and difficult question for interpretation, especially as the difference shown by these subjects seems to be a reliable one. The mean "trance" time is 88.5% as long as the mean normal time. There is a saving of 11.5% of their time of response when they *simulate* the trance state. The difference between the composite mean time of reaction of all the normal tests and that of all the "trance" tests is 2.62 secs. with a P.E.<sub>D</sub> of .71 and a D/PE<sub>D</sub> ratio of 3.7 showing this to be a fairly reliable difference.

The mean of the first normal test is 116.8% of that of the first "trance" test and that of the second normal test is 108.8% of that of the second "trance" test.

(2) *Cumulative effect.* Cumulative effect is shown when the mean time for the second normal test is compared with that of the first normal test. The former is only 86.8% of the latter. Similarly for the "trance" tests, a comparison of the mean time of the second test with that of the first test shows the former to be 93.2% of the latter. This is a further confirmation of the development of a cumulative factor in the repetition of the same work under similar conditions. This effect appears irrespective of whether the state in which the experiment takes place is a simulated hypnotic trance, the hypnotic trance itself or the normal state.

(3) *Perseverative effect.* The mean time of response on all the simulated trance tests preceding the normal tests is 22.66 secs. and that of the simulated trance tests after the normal ones is 17.52 secs. This shows the latter responses to be only 77.3% as long as the former. The mean time of response of all normal tests preceding the simulated trance tests is 23.92 secs. and that of those after the simulated trance tests is 21.45 secs. It thus takes only 89.7% as long for the subjects to respond to suggestions when they have already responded 15 mins. previously in a simulated trance state. In both these cases an appreciable perseverative factor is present.

(4) *Practice effect.* Evidence of practice effect both for day by day performance and for the four tests within a given day are found in the data presented in Table 11. These are shown graphically in Figure 26.

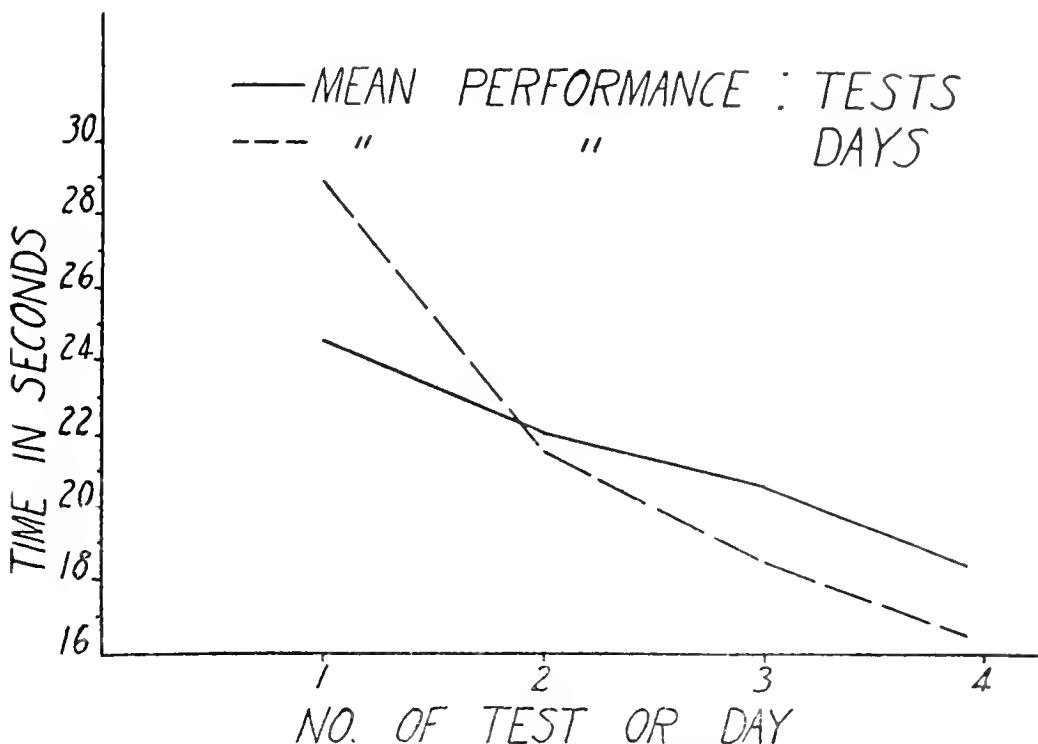


FIG. 26. Graph of data from Group 5 showing practice effect in responding to suggestions of postural sway.

For the day by day performance the mean time of response for the first day is 28.94 secs., and that of the fourth day is 16.58 secs., which shows the latter to be only 57.3% of the former. In a similar way the mean of all the first tests within each experimental day is 24.50 secs. and that of the fourth tests is 18.38 secs. so that the latter is only 75.0% of the former.

The subjects in this group were interviewed by Professor Hull when they had completed the tests. (See p. 16.) During the interview they were carefully questioned about their subjective and objective behavior in order to discover whether simulating the responses had produced a tendency of going into the trance. This was followed by a test identical in every way with the experimental tests except that the subjects were specifically instructed *not* to simulate during this test. This further test was made to discover whether there had developed any tendency to give a positive response to suggestions of postural sway. As a result of the interview it was discovered that six of the eight subjects considered that the simulation of the trance should end after the experimenter had tested for eyelid catalepsy. They believed that all the four tests were

to be made in the normal state irrespective of whether they had performed the gestures of going into the trance or not. This clearly implies a misunderstanding of the instructions given previous to the testing (p. 15). It is a fortunate misunderstanding, however, as it emphasizes a contrast in the conditions which have produced results that are similar in all essentials. This identity of simulated and trance results has never been previously demonstrated. The other two among these eight subjects understood the instructions and considered that the simulated trance was to continue during the two tests immediately following it. All of these subjects without exception, however, stated that they did not feel any subjective characteristics of hypnosis such as drowsiness, catalepsy of the eyelids, etc., which occur when the trance is induced by the method which these subjects used in simulating. The experimenter also observed their objective behavior very carefully and was not able to detect any of the objective characteristics of the trance. These two facts together with the fact that the subjects were utterly naïve of all trance phenomena justify the conclusion that they were not in a state identical with the trance state of the experimental subjects. Furthermore, when the records that were made after the experimentation and interview were compared with those taken before the experiment, it was not possible to discover any observable change.

## CHAPTER VII

### *Conclusions*

It is now possible to assemble the results obtained from the separate experiments in such a way that any general tendencies or conclusions may become evident. The apparatus used in these experiments was exactly the same in all cases, including the experiment reported by Hull and Huse whose postural sway recorder was transferred from their laboratory to the writer's. The technique for all the experiments except that reported in the first section of Chapter VI was also identical. Such similarity of apparatus and technique justifies making a summary of the results.

In addition to the primary problem of whether there is a difference in normal and trance performance on certain well-known tests of suggestibility, these experiments also furnish data on problems concerning the presence of cumulative and perseverative factors in repeated responses to suggestion as well as the further problem of the presence of practice effects in repeated responses to suggestions. The arrangement of the data in Chapters V and VI shows the bearing of each group individually on these problems and in this chapter these results are assembled so that general conclusions may be drawn.

(1) *Comparative suggestibility.* The difference in the suggestibility of each group on the tests given in the normal and trance states is summarized in Table 12.

TABLE 12  
SHOWING, IN PERCENTAGES, THE DIFFERENCE IN SUGGESTIBILITY OF EACH GROUP  
TOGETHER WITH THE CRITICAL RATIO OF THIS DIFFERENCE

A + sign indicates greater suggestibility in the trace state and a — sign indicates greater suggestibility in the normal state.

<i>Groups</i>	<i>Postural sway</i>	<i>Lines</i>	<i>Weights</i>	<i>Warmth</i>	<i>Touch</i>
1	+32.0	4.2	+12.4 2.4	+18.1 3.3	-2.1 .243
3	+14.1	4.2			
4	+54.9	4.8			
1, 3, 4	+32.7	12.2			
2	-10.1	2.6	0 0	-13.3 10.8	+6.7 .274 +8.7 2.5
5	+11.5	3.7			

When this table is examined for evidence on the comparative suggestibility of the trance and normal states it will be found

that out of a total of 12 comparative measures for the individual groups eight of these show greater suggestibility in the trance state, three show greater suggestibility in the normal state and one is indeterminate. This total, however, includes the results from the group of control subjects who only simulated the trance state. All of these differences do not have an adequate reliability, nearly all of the experiments except those on postural sway having somewhat unsatisfactory critical ratios.

The results in Table 12 show that all groups experimented on by the first technique for response to suggestions of postural sway are more suggestible in the trance. This is also the case with the control group who only simulated a trance. These results have a satisfactory reliability, the reliability of the control group being, however, slightly less than the minimum accepted for scientific proof. These experiments show, therefore, that when a hypnotic trance is induced, a subject becomes about 33% more susceptible to suggestions of postural sway than in a corresponding normal state. This is shown by the combined data from Groups 1, 3 and 4. If the results of the group of control subjects are included, however, the degree of increased suggestibility is reduced to about 28% above their normal performance.

The results from the control group need further interpretation. The results as they stand seem to require either the assumption that going through movements comparable to those of going into a trance has an effect similar to going into the trance itself though to a lesser degree or the assumption that all of these subjects were simulating. While incapable of demonstrable proof, the latter alternative cannot be considered adequate without invalidating all the results of hypnotic experimentation. These experimental groups showed the phenomena characteristic of the trance to a degree that would be considered adequate for experimentation. It is necessary, therefore, to conclude that within the limits of this experiment the results are the same whether the subjects are actually in a trance or have merely submitted to the gestures of going into a trance without showing any of its subjective or objective characteristics. Some psychologists maintain that any form of suggestion necessarily induces some degree of hypnosis, although to the writer's knowledge there have been no experi-

mental data to substantiate this theory. These results seem to confirm such a theory.

Such a conclusion concerning the results of the control group, however, does not help in the interpretation of the results obtained from Group 2 who were tested by a modified technique. This group was 10.1% more suggestible in the normal state and although a critical ratio of 2.6 is not entirely satisfactory, the chances are 96 out of 100 that it is a reliable difference. There is at least a probability that this is a characteristic difference. This group, however, was undoubtedly the one showing the most uniform characteristics of a deep trance. In this respect they form a striking contrast to the control group. That the result is not due to the greater depth of trance is shown by the fact that when this group was subsequently tested by Miss Hope (Group 3) with the use of the main technique their result showed greater suggestibility in the trance. The conclusion seems to be justified, therefore, that the difference of 10.1% in favor of greater suggestibility in the normal state is probably due to the technique used for this particular group. If this is the correct explanation, it tends to emphasize the importance of technique as distinguished from apparatus and procedure in the determination of psychological results. It has not been possible to determine from these data exactly what the factor was that caused the change in suggestibility when the modified technique was used.

In the seven experiments conducted with the lines, weights, warmth and touch, four show greater suggestibility in the trance state, two show greater suggestibility in the normal state and one is indeterminate. There is only one, however, which has a satisfactory critical ratio. This difference of 13.3% with a critical ratio of 10.8 in favor of greater suggestibility in the normal state was obtained when testing Group 2 with the modified technique, a result which corresponds rather closely with that obtained from this group on the sway tests. If, however, the results from Group 1 are accepted as the more valid, it seems probable that there is, in general, an increase in suggestibility in the trance for these tests also. The differences obtained for this group with the lines and weights, while of appreciable size, are considerably smaller than those obtained on the postural sway tests.

(2) *Cumulative effect.* The amount of cumulative effect shown in the experiments is summarized in Table 13.

TABLE 13\*

SHOWING, IN PERCENTAGES, THE AMOUNT OF CUMULATIVE EFFECT PRESENT  
IN BOTH THE NORMAL AND TRANCE STATES.

This is determined by finding the complement of the ratio of results on the second tests to those of the first tests. A + sign indicates an increase and a — sign indicates a decrease in suggestibility on the second test and, consequently, the presence or absence of cumulative effect, respectively.

Groups	Postural sway		Lines		Weights		Warmth	
	Normal	Trance	Normal	Trance	Normal	Trance	Normal	Trance
Group 1	+27.9	+20.5	-8.9	-2.4	+20.8	+7.5	-3.1	+5.5
Group 3	+ 4.4	+16.4						
Group 4	+24.1	+23.8						
Group 2	+10.9	+18.8						
Group 5	+13.2	+ 6.8						
Sums	+80.5	+86.3	-8.9	-2.4	+20.8	+7.5	-3.1	+5.5
Means	+16.1	+17.26						

\*Owing to the fact that only one test was given to Group 2 on the lines, weights, warmth and touch, it was not possible to obtain comparable data from them to be included in this table.

Among the 16 measures included in this table there are 13 which show that the suggestibility of a person increases when the test is repeated after an interval of 1½ mins. The 10 measures of cumulative effect derived from the tests of postural sway all show a clear tendency toward an increased suggestibility on the second test. There is no significant difference, however, between the normal and trance states in this respect. These results are also characteristic of the responses of the control group. The results from the experiment with the lines, weights and warmth are again difficult to interpret. The most probable conclusion concerning the warmth experiment is that there is no significant effect shown. The results from the lines and weights, however, are contradictory in spite of the similarity of the results of these two experiments for comparative suggestibility. The only clue to be derived from observing the subjects during the experimentation is that the subjects were much more lethargic when lifting the weights than when estimating the length of a line. The latter requires rather an active and alert response which might possibly lead to a more critical judgment. The subjects undoubtedly displayed more muscular tension in estimating the lines than in lifting the weights. This explanation, however, is put forward very tentatively.

(3) *Perseverative effect.* The amount of perseveration shown in the experiments is summarized in Table 14.

TABLE 14\*

SHOWING, IN PERCENTAGES, IN THE NORMAL COLUMN THE AMOUNT OF PERSEVERATION DUE TO RESPONDING TO THE NORMAL TESTS (ON THE SUBSEQUENT TRANCE TESTS) AND IN THE TRANCE COLUMN, THE AMOUNT DUE TO RESPONDING TO THE TRANCE TESTS (ON THE SUBSEQUENT NORMAL TESTS).

The percentages are obtained by finding the complement of the ratio of results from tests coming after the normal and trance tests with those preceding these tests, respectively. A + sign indicates the presence and a — sign indicates the absence of perseveration in tests coming after the given state.

Groups	Postural sway		Lines		Weights		Warmth	
	Normal	Trance	Normal	Trance	Normal	Trance	Normal	Trance
Group 1	+20.0	+22.2	-7.1	+20.3	+26.2	-11.3	+3.3	+5.4
Group 3	+ 3.1	+ 3.8						
Group 4	-21.3	+38.3						
Group 5	+22.7	+10.3						
Sums	+24.5	+74.6						
Means	+ 6.1	+18.7	-7.1	+20.3	+26.2	-11.3	+ .3	+5.4

\*Owing to the different technique used with Group 2 it was not possible to obtain comparable data from them to be included in this table. With this group, a period of not less than 24 hours intervened between the normal and trance tests.

Of the 14 measures summarized in this table, 11 of them show a perseverative effect. All measures of perseveration obtained from the postural sway test except one show a greater suggestibility in the third and fourth tests irrespective of whether the first two tests were made in the normal or trance state. The gross results, however, show a greater degree of perseveration for the trance but this result is somewhat overemphasized by the results obtained from Group 4. No adequate explanation can be offered for the striking reversal in the effect of the normal and trance tests that is shown by this group.

The results obtained from Group 1 for the other parts of the experiment are inconclusive. The results from the lines and weights form almost an exact reversal of each other and cannot be satisfactorily related to those shown for these experiments in Table 13. The results from the warmth experiment, while somewhat small in amount, tend to confirm the general conclusion that there is a perseverative effect present and that the perseveration of the trance to subsequent tests is somewhat greater than that of the normal state.

(4) *Practice effect.* The degree of practice effect as shown in day by day performance on the postural sway test is summarized in Table 15.

TABLE 15  
SHOWING THE MEAN TIME OF RESPONSE FOR EACH GROUP ON THE FOUR TESTS  
OF POSTURAL SWAY THAT WERE GIVEN ON EACH EXPERIMENTAL DAY.

Groups	Number of day			
	1st Day	2d Day	3d Day	4th Day
Group 1	23.41	22.13	23.03	21.33
Group 3	9.19	8.50	7.65	6.40
Group 4	21.13	18.19	15.41	13.72
Group 2*	10.88	9.15	7.15	6.88
Group 5	28.94	21.55	18.48	16.58
Sums	93.55	79.52	71.72	64.91
Means	18.71	15.90	14.34	12.98

\*These values were obtained by taking the averages of two days' tests, this change being made necessary on account of the different technique used with this group.

All these groups show the characteristics of learning when the averages of each day's performance are taken. This has been shown by means of graphs in Chapters V and VI where the results obtained from each group are separately discussed. The only exception is found in the data of Group 1 which show a very slight reversal for the second and third day's performance. If a graph were plotted from the composite means it would be a typical learning curve showing negative acceleration.

The data from Group 5, the control group, is included in the final composite means as the general interpretation of their data is that the performance of certain gestures of going into the trance produces an effect comparable in some ways to being in the trance itself. Table 15 shows that their means for each day's tests parallel the composite means of the other groups rather closely.

The composite mean time of response on the fourth day is 69.4% of that of the first day. This means that when this test for suggestibility is repeated for four days with the technique described in Chapter III the subjects are about 30.0% more suggestible on the fourth day than they are on the first day.

A similar result is obtained when the data of the first, second, third and fourth tests on each day are taken separately. In the last table the average time of response for all

the tests of each experimental day was given. The results obtained from the arrangement of the data by tests are summarized in Table 16.

TABLE 16\*

SHOWING THE MEAN TIME OF RESPONSE OF EACH GROUP ON THE SEPARATE TESTS OF POSTURAL SWAY GIVEN DURING EACH EXPERIMENTAL DAY.

Groups	Number of Test			
	1st Test	2d Test	3d Test	4th Test
Group 1	29.89	20.42	21.47	18.11
Group 3	8.38	7.77	8.33	7.25
Group 4	23.56	15.25	15.31	14.31
Group 5	24.50	22.08	20.59	18.38
Sums	86.33	65.52	65.70	58.05
Means	21.58	16.38	16.43	14.51

\*Owing to the different technique used with Group 2 it was not possible to obtain comparable data from them to be included in this table. This group was only given two tests on each experimental day.

This table shows that there is an appreciable decrease in the time of response of each group when the tests are repeated under the conditions of this experiment. This means that an increase in suggestibility occurs when the stimulation is repeated. The time of response on the fourth test is 67.2% as long as that on the first test, a result which furnishes an interesting parallel with that obtained for day by day learning. There is, therefore, an increase of about 30.0% in suggestibility when the test is repeated four times within short intervals of one another as well as when the average time of the fourth day's tests is compared with that of the first day's test. An interval of 24 hours or more between each experimental day seems to have the effect of decreasing suggestibility to such an extent that it required 16 stimulations when distributed in this way to produce the same increase in suggestibility as repeating the test four times within a short interval of time would do. It is problematic whether both of these effects should be called either summation or learning. When the tests are repeated within a given day the effect resembles the factor called summation but when the day by day results are considered the result resembles learning. It is possible, however, that both these factors have the same basic mechanism.

An increase in the time of response on the third test as compared with that on the second test is characteristic of

every group except the control group. The interval between these two groups was 15 mins. and there was also a change either from the normal to the trance state or vice versa during this interval. This lengthening of the interval between the tests together with the change from one state to the other completely obliterates the increase in suggestibility that could be expected from the third repetition of the test.

It is noteworthy that the control group, Group 5, is the only one which does not show an increase in the time of response on the third test. It is difficult to determine the exact significance of this fact but it is the only index that shows a clear differentiation between the control and experimental groups.

TESTS

SUGGESTIBILITY

## CHAPTER VIII

### *Discussion*

A brief discussion of some of the more general conclusions of this study is given in this chapter.

The test for postural sway shows an unquestionable increase in the suggestibility of all groups when tested by the main technique used in these experiments. The results of the other tests made with this technique do not furnish clear evidence of an increased suggestibility in the trance although there is some probability that there is such an increase. The amount of increase, however, is much less than with the postural sway test.

The undoubted increase shown in this test must be considered in any theory that attempts to explain the nature of hypnosis. It does not prove that the trance is merely a state of increased suggestibility but it does show that a state of increased suggestibility exists when the trance has been induced. Two facts, however, present a difficulty which prevent the unqualified acceptance of this conclusion. There is first the fact that Group 2 went into a deep trance and yet showed less suggestibility in the trance when tested by a different technique. There is the further fact that Group 5 showed an increase in suggestibility while *simulating* the trance, a state which, both from objective and subjective observation, appeared to be a normal state. Nevertheless, the very strong evidence obtained by combining the data of Groups 1, 3 and 4 forces the conclusion that the modified technique in some way obscures the actual relationship of the trance to suggestibility and that the movements performed in simulating the trance with Group 5 has the same kind of effect as occurs when actually going into the trance, though to a much smaller degree.

The difference in the degree of suggestibility which is characteristic of the postural sway experiment when compared with the other experiments has an indirect bearing upon one of the theories of the nature of hypnosis. Some writers have emphasized the personal relationship of submission that exists on the part of the subject toward the experimenter as the chief element in the nature of the trance. If this hypothesis is accepted it seems possible that the increase is due to the closer personal relationship existing between the subject and ex-

perimenter in the postural sway test, where the subject is stimulated continuously by the experimenter. In the other experiments where the instructions are typewritten and the experimenter merely records the responses the personal relationship of experimenter and subject are reduced to a minimum. The results reported in this monograph suggest that it will be profitable to carry the investigation of this personal relationship further. The fact that the problem was not specifically studied in these experiments makes it impossible to draw any conclusions concerning the nature of the trance from the data.

The fact that there is an increase of suggestibility due to the repetition of the test after a short interval of time has been called cumulative effect. While the repetition of suggestions of postural sway undoubtedly causes an increase in suggestibility, the results from the other experiments are entirely inconclusive. The result of suggestions of postural sway is apparently very different from the phenomenon called summation but the results seem to indicate that the more obvious characteristics of summation appear in such relatively complex reactions as were evoked in this experiment. To determine whether or not this is true of other complex responses suggests a fruitful field of experimentation.

The characteristic called perseverative effect differs from what has been called cumulative effect in three important respects. There was an interval 10 times as long between the groups of tests being considered, there was a complete change from the normal to the trance state or vice versa and, further, the students engaged in many types of activity during the interval so as to make as complete a change as possible between the states. In spite of these changes there is still a clear indication of perseverative effect, i.e., a tendency to react more rapidly in a given way when similar reactions have previously been made. This result is significant for the psychology of learning as it shows that a relatively complex response follows the same characteristics as the simpler ones that are usually used in the determination of the laws of learning. It also seems to throw light on some of the phases of the motivation of behavior. The desirability of determining the degree of perseverative effect in other complex responses is obvious.

The practice effect shown in these results is very similar whether the performance on the several tests given within a day or that of all the tests given on each day is considered. In the case of postural sway reactions there is a significant increase in the suggestibility of the subjects in both cases as measured by the time of response. A similar decrease in time of reaction is found in the responses of the control group in spite of the fact that when tests were made to determine whether any change had occurred in their normal pre-test response after finishing the tests of their simulated responses, it was found that there had been no change from the refractory or negativistic type shown in the preliminary trials. Their results probably indicate practice in facility to simulate but it is significant that this parallels so closely the results obtained from the experimental groups where there is, apparently, practice in suggestibility. The work of the control group thus becomes significant for the fact that their simulation resembles that of the experimental groups so closely while it does not produce a state of increased suggestibility. This shows the specific nature of the habit being established and the apparent lack of a tendency for the simulated responses to establish the habit of responding positively when the subjects are told to respond naturally. The evidence, in general, supports Krueger's conclusions that suggestibility as an experimental unit follows the laws of ordinary learning. The corroboration derived from Krueger's experiment which was of an entirely different nature, seems to warrant the general conclusion that learning occurs in the case of the fairly complex responses called suggestibility. These facts indicate the desirability of obtaining practice curves from many of the complex responses known as "personality traits."

In the performance of the groups on the separate tests given within each experimental day there is a tendency to increase the time of response on the third test. Such, however, is not the case with the control group, this being the only way in which their behavior differs from that of the experimental groups. The amount of increase is small and the main significance of the fact seems to be that the change occurring between the second and third tests prevented the acceleration of response that should have occurred if the tests followed each other in the same manner as the second followed the first.

In the results obtained from Group 1 on the other experiments there is no change for either day by day or individual test results in the warmth experiment. For both the lines and weights experiment, however, there is a decrease in suggestibility when each successive day's performance is considered but there is, on the contrary, an increase when the tests are repeated within a given day. While the data are not adequate to make final generalizations the tendency seems to be for the frequent repetition of the stimulation to increase a subject's susceptibility but that when these stimulations are distributed over a lengthened period of time the tendency is for them to become less effective. The data from Group 2 on these experiments are inconclusive on the day by day performance except in the warmth experiment in which there is a definite increase. The lack of similarity between these results and those obtained from the postural sway test seems to indicate that no general trait of suggestibility can be found, at least in the responses of college students. This result agrees with that obtained by Brown and Beck, both of whom worked with adults. The result, however, does not agree with the conclusions of Aveling and Hargreaves and Otis, both of their experiments being carried out on children. Such a situation suggests that a possible explanation of the divergence in results is to be found in the difference in the age of the subjects.

Probably the most important results obtained in the entire series of experiments are those secured from the control group. The simulated responses duplicate the experimental in all significant respects except the one mentioned above. In the preliminary work for another experiment on forgetting, the writer also found it impossible to distinguish simulated forgetting from true forgetting. Whether or not this is a general tendency, and if so, what the factor is that produces this identity of results constitute two problems of major significance for experimental psychology. It is not feasible to assume that all the experimental subjects were simulating and that the similarity of results was due to this. Almost every subject showed a complete amnesia for events in the trance and every subject showed such phenomena as easily induced catalepsies. These are generally regarded as satisfactory indications of the trance. Neither is it feasible to assume that

the control subjects were in a trance in the same sense as the experimental subjects. There was no catalepsy of the eyelids present when they were tested and no amnesia for the events occurring in the trance. It is necessary to conclude that the similarity of results is either due to repeating the gestures of going into the trance which occurred before the tests of simulation or to the fact that simulated responses sometimes duplicate the true responses so closely that they cannot be definitely distinguished. The latter conclusion is substantiated by the experimenter's experience with the memory tests mentioned above but is withheld as an hypothesis until further evidence is submitted. The explanation tentatively submitted is that the effect of submitting merely to the gesture of going into the trance has an effect similar to going into the trance itself. In spite of the inconclusiveness of the evidence, the facts derived from this phase of the experiment are probably of major significance on account of their bearing on general problems of psychological experimentation.

## CHAPTER IX

### *Summary*

1. By the main technique used in these experiments the subjects showed an increase of about 33% in suggestibility on the postural sway test.
2. A similar increase in suggestibility was not found when the same technique was used with tests of the lines, weights, warmth and touch.
3. The control group showed an increase in suggestibility, though to a lesser degree and with a smaller reliability than the experimental groups. The data do not provide a clear explanation of this result.
4. The results obtained by the second technique show an increase in suggestibility of about 10% in the normal state. Further experimentation with the same group by the main technique showed that the difference in result is probably a function of the technique used.
5. Cumulative effect is shown in 13 out of a possible 16 measures. For the postural sway tests the second response was about 16% faster than the first and this difference was found irrespective of whether the tests were made in the normal or trance state.
6. Perseverative effect is found in 11 out of a possible 14 measures. There is some evidence that trance tests have a slightly greater perseverative effect than normal tests.
7. A progressive decrease was found in the average time of response on all tests of postural sway given on each of the four experimental days, the time for the fourth day's tests being about 69% as long as that of the first day's tests. A curve of the results of practice would show negative acceleration.
8. A similar decrease was found in the time taken to respond to the postural sway tests when the data are arranged for each of the four tests given on the experimental days, the time for the fourth test being 67% of that of the first test. There is a slight increase in the time of the third as compared with the second test but this is probably due to the significant changes occurring between these two tests.

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